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Summary of Amendments:

1. Minor Amendments
2. Chapter 1: "DISKS" section extended to discuss 1.44 MB, 3½ inch diskettes.
3. Chapter 5: "THE FORMAT" command extended to document two new switch options. These switch options enable the formatting of 720KB, 3½ inch diskettes in a 1.44 MB drive.
4. A new Appendix H: "THE DISK CACHE SYSTEM".
   This appendix describes how to install OLICACHE.SYS for improving disk read access time.

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2				
3				
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6				
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PREFACE

This manual is a user guide for the MS-DOS operating system. It describes Microsoft Version 3.20 of MS-DOS, and is for anyone who wishes to use this operating system on an Olivetti Personal Computer.

SUMMARY

The first chapter provides a general introduction to MS-DOS.

Chapters 2 and 3 describe in more detail the major functions and features of MS-DOS. These include: using control keys and function keys; files and the hierarchical directory structure; entering and using MS-DOS commands.

Chapter 5 is a full and detailed reference to all the MS-DOS commands. It includes a section on commands to use and those not to use when the computer is connected to a network.

Chapters 6 to 10 provide detailed reference information on the Video File Editor (EDIT), the Line Editor (EDLIN), the Linker (MS-LINK) and the Debugger (DEBUG).

RELATED PUBLICATIONS

Installation and Operations Guide for your Personal Computer
Getting Started With MS-DOS: Software Installation Guide (Code 4040360 J)
MS GW-BASIC Interpreter under MS-DOS User Guide (Code 4034490 C)
MS-DOS System Programmer Guide, Vol I (Code 4024270 M)
MS-DOS System Programmer Guide, Vol II (Code 4033300 G)
MS-DOS Quick Reference Guide (Code 4034470 S)

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CONTENTS

3. FILES AND DIRECTORIES

4. ENTERING AND USING MS-DOS COMMANDS

H. THE DISK CACHE SYSTEM

1. INTRODUCTION

ABOUT THIS CHAPTER

This chapter introduces some of the more commonly used features of MS-DOS, provides some information on disk handling and defines the notation convention used throughout this book.

CONTENTS

WHAT IS MS-DOS?

The Microsoft Disk Operating System (MS-DOS) is a group of programs that controls the running and operation of your computer. It provides an interface between you and your computer.

Through MS-DOS you communicate with the Central Processing Unit (CPU), monitor, disk drives, printer, and other peripherals. The Disk Operating System enables you to manipulate program and data files stored on diskette or hard disk.

MS-DOS is supplied on your MS-DOS diskette.

The major features of MS-DOS are outlined in the sections that follow.

COMMAND LIBRARY

MS-DOS has a command library of over 40 commands that provide you with an environment suitable for handling files of information, developing programs, and running applications.

FILE AND DIRECTORY HANDLING

File handling commands not only allow you to copy and delete files, copy entire diskettes, display the contents of files, etc., but also to group files into directories at your convenience. Moreover, MS-DOS enables you to create directories within a directory, thereby creating a hierarchical directory structure. Refer to Chapter 3 for details.

PROGRAMMING TOOLS

A set of programming tools which enables you to write and develop programs. You can edit program files using the Video File Editor (see Chapter 6) or Line Editor EDLIN (see Chapter 7), link object files using the LINK utility (see Chapter 8), and debug executable files using the DEBUG utility (see Chapter 9). Macro Assembler, PASCAL, FORTRAN and other high level languages are separately available, to produce executable files. The GW-BASIC interpreter is available on your system disk for interpretive programming.

INTERNAL AND EXTERNAL COMMANDS

When MS-DOS is initialized some commands are loaded into memory and reside there. Other commands remain on disk. The former are known as internal commands, the latter are external commands and are loaded into memory and executed when required. Most of these external commands, after they are executed, are removed from memory, thereby optimizing the use of memory. However a few of these external commands, (GRAFTABL, GRAPHICS, PRINT, and SHARE), remain resident in memory after they have executed (see Chapter 5 for details of these commands).

BATCH PROCESSING

MS-DOS enables a commonly executed series of commands to be grouped into one file -a batch file -that can be executed simply by entering the file name. Refer to Chapter 4 for details.

THE AUTOEXEC.BAT FILE

The AUTOEXEC.BAT file is a special batch file which, if present, is executed automatically at system initialization. This is useful if your application requires a certain sequence of commands to be executed every time the system is initialized (see Chapter 4).

REAL-TIME CLOCK FUNCTIONS

When no AUTOEXEC.BAT file is present MS-DOS asks you the DATE and TIME.

MS-DOS has two commands that utilize the Real-Time Clock. These are:

- DATE which enables you to set the date
- TIME which enables you to set the time

These are important not only for programs that use time-dependent functions, but also because MS-DOS provides you with information about the time and date of creation or modification of your files.

INTERFACE HANDLING

MS-DOS allows you to communicate with compatible devices (plotters, printers, modems, etc.) via the standard RS-232-C serial interface. You will need to set the protocol for the interface using the MODE command (see Chapter 5).

DISKS

Information is stored either on 3 1/2 in. or on 5 1/4 in. floppy disks or, if your system has, on hard disk. This manual will refer to the former as diskettes and the latter as the hard or fixed disk. The term ''disk'' will be used to mean either diskette or hard disk.

Drive letters (A,B,C through Z) are the means by which commands can identify a particular drive.

The drive letter of the first diskette drive in any system is A. The drive letter of any second diskette drive is B. The drive letter of the first hard disk is C. Drive letters D through Z are used for additional hard disks, disk partitions, virtual disks and dummy drives.

The capacity, of a disk drive determines the type of diskettes that can be used in it.

Diskettes can have a variety of capacities to hold data, as illustrated in the following tables. See your Installation and Operations Guide to check what types of Diskette capacities your disk drive(s) can read and write.

5 1/4 Inch Diskettes

The following table shows the different capacities a 5 1/4 inch diskette may have.

	Double Density 40 track (48 t.p.i.)		High Density 80 track (96 t.p.i.)
	8 sector	9 sector	15 sector
Single Sided	160 KB	180 KB	-
Double Sided	320 KB	360 KB	1.2 MB

Fig. 1-1 5 1/4 Inch Diskette Capacities

5 1/4 Inch Diskette Compatibility

Standard formatting in Normal-Capacity drives is 40 tracks, 9 sectors per track. Formatting in High-Capacity drives is 80 tracks, 15 sectors per track. To format diskettes as 40 tracks, 9 sectors per track in High-Capacity drives use the **/4** switch. However note that Normal-Density diskettes written to in High-Capacity drives cannot be reliably read in Normal-Capacity drives. To prevent accidental writing to Normal-Density diskettes in a High-Capacity drive, write protect the diskette.

The following figure shows 5 1/4 inch diskette compatibility in different drives:

		DRIVE		
		Normal Capacity		High Capacity
		Single sided (160/180 KB)	Double sided (320/360 KB)	Double sided (1.2MB)
DISKETTES	48 tpi Single sided	Read/Write	Read/Write	Read
	48 tpi Double sided	—	Read/Write	Read/Write*
	96 tpi Double sided	—	—	Read/Write

* Once written the diskette cannot be reliably read in Normal Capacity Double Sided Drives.

Fig. 1-2 5 1/4 Inch Diskette Type Compatibility in Different Capacity Drives

3 1/2 Inch Diskettes

These diskettes have 135 tracks per inch (t.p.i.) and can be formatted double sided with 80 tracks. Each track can be formatted with nine or 18 sectors. See the following table which shows the different capacities a 3 1/2 diskette may have.

	High Density 80 track (96 t.p.i. or 15 t.p.i.)	
	9 sector	18 sector
Double Sided	720 KB	1.44 MB

Fig. 1-3 3 1/2 Inch Diskette Capacities

Obviously you should not place 3 1/2 inch diskettes in a 5 1/4 inch drive, nor can you place 5 1/4 inch diskettes into a 3 1/2 inch drive.

3 1/2 Inch Diskette Compatibility

The following figure shows 3 1/2 inch diskette compatibility in different drives:

		DRIVE	
		720KB	1.44MB
DISKS	720KB	Read/Write Format	Read/Write*
	1.44MB		Read/Write Format

* Once written the diskette cannot be reliably read in a 720KB drive.

Fig. 1-4 Diskette Type Compatibility in Different Capacity Drives

It is possible to format 720KB diskettes in 1.44 MB drives (see the FORMAT command in Chapter 5 of the "MS-DOS User Guide") however this formatting is not as reliable as formatting 720 KB diskettes in a 720 KB drive. Therefore you are recommended to format 720 KB diskettes in 720 KB drives wherever possible. To prevent accidental writing to 720 KB diskettes in a High-Capacity drive, write protect the diskette.

DISKETTE HANDLING

Although diskettes are generally durable, damage to diskettes will be minimized if you take the following precautions:

- Never bend 5 1/4 inch diskettes.
- Do not touch the exposed surface of the diskette or allow liquids, dust or cigarette ash to come into contact with it.
- Never expose your diskettes to strong magnetic fields, for example keep them away from telephones and tape recorders.

- Keep your diskettes away from direct sunshine, and store them in a cool place.
- Always keep a 5 1/4 inch diskette in its cardboard envelope when not in use
- Always file them in the diskette carton.
- Keep dust out of the diskette drives by keeping the drive covers closed when not in use.
- Do not attach anything to diskettes with paper clips or rubber bands.

PURCHASING DISKETTES

When purchasing your media make sure that the diskettes are Double Sided as all the Olivetti Disk Drives have twin heads.

5 1/4 inch diskettes should be Double Density (48 t.p.i.) for Normal Capacity 5 1/4 inch disk drives. High Capacity 5 1/4 inch disk drives require 96 t.p.i. High-Density Diskettes; these diskettes format to 1.2 MB.

3 1/2 inch disk drives require 135 t.p.i. Micro Floppy Diskettes. 3 1/2 inch diskettes should be 1 MB unformatted for 720 KB (formatted) 3 1/2 inch disk drives. High Capacity 3 1/2 inch drives require 2 MB unformatted diskettes, these diskettes format to 1.44 MB.

LABELING DISKETTES

Every carton of diskettes contains a supply of self-adhesive labels for identifying diskettes. It is good practice to write all relevant details on the label before attaching it to the diskette. But if you do find it necessary to write on the label after sticking it to a 5 1/4 inch diskette, you should avoid using sharp pencils or ball-point pens as these may damage the surface of the diskette. In this case a felt-tipped pen is recommended.

WRITE-PROTECTION

To protect your data from being accidentally overwritten, you can apply write-protection to your diskettes.

5 1/4 Inch Diskette Write-Protection

For 5 1/4 inch diskettes a sheet of aluminized write-protect tabs is provided with every carton of diskettes. To apply write-protection, simply stick a tab over the write-protect notch cut into the side of the diskette. To remove write-protection, simply remove the tab. See the following figure which shows you the position of the write protect notch:

Fig. 1-5 The position of the Write Protect Notch on 5 1/4 Inch Diskettes

3 1/2 Inch Diskette Protection

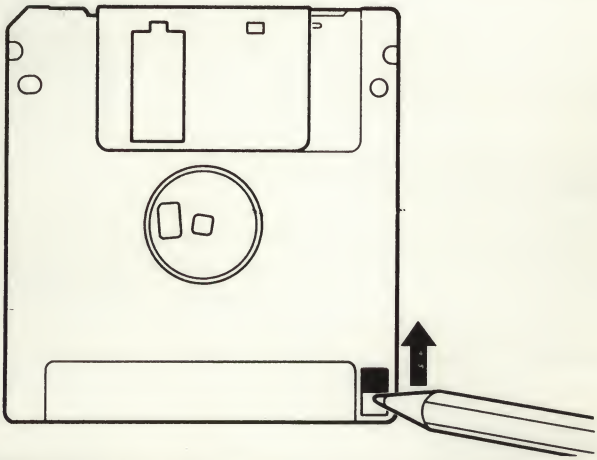

Fig. 1-6 Unprotected 3 1/2 Inch Diskette

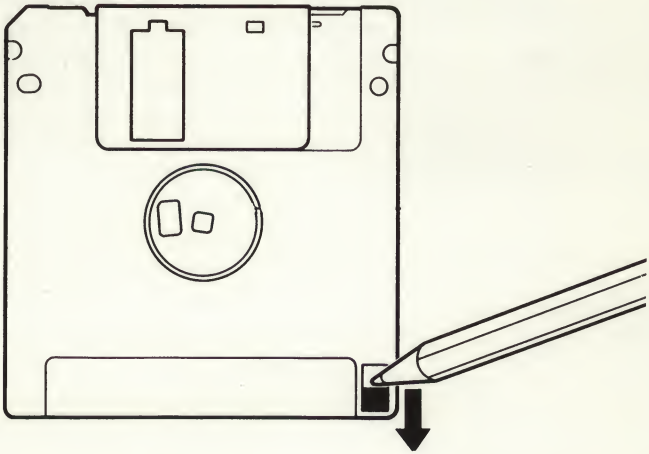

Fig. 1-7 Write Protected 3 1/2 Inch Diskette

For 3 1/2 inch diskettes there is a movable tag on the reverse side in the right hand corner (see the Figure ''Unprotected 3 1/2 Inch Diskette''). The first figure shows the diskette with the tag up, this diskette is not write protected. Slide the tag down to the bottom of the slot, it clicks into place (see the Figure ''Write Protected 3 1/2 inch Diskette''). Now if the computer tries to write to this diskette or to delete any files on the diskette, the result will be an error message:

Write protect error writing drive A
Abort, Retry, Ignore

If you really wish to write to the diskette, remove it from the drive, slide the tag up, until it clicks into place, replace it in the drive; then press **R** to retry. If you had the wrong disk in the drive do not change disks at this stage, instead press **A** to abort the operation; then exchange the diskettes.

VIRTUAL DISK

A virtual disk is part of main memory which emulates a backing store disk. The virtual disk appears to the operating system just like any other disk drive. For example, if a virtual disk is installed on a computer with two floppy disk drives "A:" and "B:", the virtual disk is drive "C:". The only difference between virtual disk and real disk is that when you turn your machine off, the information on virtual disk will be lost. So remember to COPY all files you want to keep from virtual disk to a real disk, before you turn your machine off. See Appendix F "The Virtual Disk System" for details on installing virtual disk.

NOTATION CONVENTIONS

The following notation conventions are used throughout this book:

- Uppercase, bold letters and words within a syntax line represent keywords that must be typed exactly as shown.

  Example:

  In the command line:

  DISKCOPY [*sourcedrive*:] [*targetdrive*:]

  DISKCOPY should be typed as shown.

  Outside syntax lines, keywords are shown in uppercase but not in bold.

  Note that uppercase letters and words are used simply as visual aids in this manual. Keywords may be typed in lowercase if desired.

- Lowercase italicized characters and words represent parameter names. They indicate that variable information is to be provided by the user.

  Example:

  In the command line:

  DISKCOPY A: B:

  ---

  both *sourcedrive* and *targetdrive* have been replaced by specific values, that is A and B.

- Hyphens may join lowercase letters or words to form a single parameter name.

Example:

In the command line:

R [*register-name*|F]

register-name is a single variable item that should be replaced by a single specific value, for example AX.

- A blank, a comma, a colon, or a semicolon may be used to separate the items in a line. In this manual the blank is usually shown in syntax lines.
- The symbols listed below are used to define the syntax of a line, but should not be typed in the actual line:

  [ ] brackets

  { } braces

  | vertical stroke (''or'' sign)

  ... ellipsis

- Items contained by brackets ([ ]) are optional and so may be selected or not.

  Example:

  The representation:

  [*filespec*]

  indicates that a *filespec* may be entered or omitted.

- Items enclosed by braces ({ }) and separated by vertical strokes (|) are alternatives. You should select only one such alternative.

Example:

The representation:

{A|B|C}

indicates that either A or B or C should be selected.

- Items enclosed by brackets ([ ]) and separated by vertical strokes (|) are optional alternatives. You may choose one such alternative, or none at all.

  Example:

  The representation:

  [A|B|C]

  indicates that A or B or C may, but need not, be selected.

- An ellipsis indicates that the preceding item or group of items may be repeated more than once in succession.

  Example:

  The representation:

  A [B]...

  indicates that A can be typed alone or can be followed by one or more occurences of:

  B

- Letters and words in bold indicate MS-DOS messages that appear on your Personal Computer screen. For example:

  Insert new diskette for drive B:
  and strike ENTER when ready

- Letters and words shown in condensed bold indicate that you must press a specific key. For example the key whose inscription is CTRL is always referred to as **CTRL**.

- Commands need to be confirmed by pressing ↵ (the **ENTER** key), at the end of the command line.

FUNCTION	KEY COMBINATION	MEANING
COPYLINE	**F3**	Copies all remaining characters in the source line to the command line.
SKIP1	**DEL**	Skip over one character in the source line.
SKIPTO	**F4** then type a *character*	Skip over characters in the source line up to *character*.
KILL	**ESC**	Terminates input and terminates the command line.
INSERT	**INS**	Enters/exits insert mode.
NEWTEMP	**F5**	Creates a new source line by copying the command line to the source line, but does not execute.

4. ENTERING AND USING MS-DOS COMMANDS

ABOUT THIS CHAPTER

This chapter defines the syntax for a command, explains how commands can be grouped into batch files, and how the output from a command can be redirected to some device other than the VDU. It also describes the concept of ''piping'', whereby the output from one command becomes the input to another.

For further details of commands mentioned in this chapter refer to Chapter 5.

CONTENTS

When you enter an external command, do not include its file name extension. External commands include:

ASSIGN	FC	MORE
ATTRIB	FDISK	PRINT
BACKUP	FIND	RECOVER
CHKDSK	FORMAT	REPLACE
COMMAND	GRAFTABL	RESTORE
COMP	GRAPHICS	SELECT
DEBUG	GWBASIC	SHARE
DISKCOMP	HEXDUMP	SORT
DISKCOPY	JOIN	SUBST
EDIT	LABEL	SYS
EDLIN	LINK	TREE
EXE2BIN	MODE	XCOPY

So for example invoking FORMAT executes the command file FORMAT.COM and invoking ATTRIB executes the executable file ATTRIB.EXE. .EXE files have to be located in memory when they are loaded. Some .EXE files can be converted to .COM files using the MS-DOS utility EXE2BIN. .COM files are in memory image format and always load starting at location 100H in a memory segment, therefore .COM format is more compact and loads faster. Because all external commands reside on disk, you can create commands and add them to the system by writing programs in assembler or high level languages and compiling them. MS Compilers and the assembler MASM produce object code (.OBJ) files. These .OBJ files have to be linked, using the linker LINK (see Chapter 8). The LINK produces .EXE (executable) files. If the .EXE cannot be converted to .COM files the following error message appears:

File cannot be converted

Refer to chapter 5 for more details on EXE2BIN.

When you specify an external command simply as KEYWORD, MS-DOS first looks in the default directory of the default drive. It then searches the paths set in the PATH variable of the environment. If the KEYWORD command file is not found, it cannot be executed and the following error message appears:

Bad command or filename

For external commands the general command format can be extended by preceding the KEYWORD with the Drive where the command file resides and/or the path leading to its directory.

EXTERNAL COMMAND SYNTAX

The general format of external commands is therefore defined as follows:

[*drive*:][*path*]KEYWORD[*parameter*]...

PARAMETER TYPE	MEANING
drive:	A one character drive specifier followed by a colon, specifying the drive where the KEYWORD is to be found.
path	{[\]*directory*[*directory*]...\ | \} If the path consists of the root directory, only one backslash should be used, for example: C:\
filename or *directory*	Either a one to eight character string or a one to eight character string followed by a period (.) and a three character extension. A file name must be made up from the following characters: A-Z 0-9 $ & # ~ % ' ( ) - _ @ { } ?

PARAMETER TYPE	MEANING
filename or *directory* (cont.)	Note: lower-case letters are transformed into upper case. For example: NEWFILE NEWFILE.TXT
KEYWORD	A one to eight character mnemonic that specifies the command to be executed. It must exclude any file name extension.
parameter	A parameter to the command defining the command action. The number of parameters depends on the command executed. Refer to the preceding section "PARAMETERS" for more details of parameter types.

INFORMATION COMMON TO ALL MS-DOS COMMANDS

The following information applies to all MS-DOS commands:

- Commands are usually followed by one or more parameters.
- Commands and parameters may be entered in upper case or lower case, or a combination of both. MS-DOS will convert all lower case letters to upper case.
- Commands and parameters must be separated by delimiters. A space is usually used; for example:

  COPY A:MYFILE B:YOURFILE

  You can also use the comma (,), semicolon (;) or the equal sign (=) as delimiters in MS-DOS commands.

For clarity, this manual will use a space as the delimiter

- When you are instructed to "Press any key", you can press any alphabetic (A-Z) or numeric (1-9) key.
- You must include the file name extension when referring to a file that already has one.
- You can abort commands that perform input/output by pressing **CTRL C** or **CTRL BREAK**.
- Commands take effect only after you have pressed ↵ **ENTER.**
- Wild cards (global file name characters) and device names (for example, PRN or CON) are not allowed in the names of any commands.
- When commands produce a large amount of output on the screen, the display will automatically scroll to the next screen. You can press **CTRL S** or **CTRL NUMLOCK** to suspend the display. Press any key to resume the display on the screen.
- MS-DOS control keys and editing function keys can be used when entering commands. Refer to Chapter 2 for a description of these keys.
- The default prompt from the command processor is the default drive designation plus a greater-than sign; for example, A>. You can change this prompt using the PROMPT command (see Chapter 5 for details).
- Disk drives will be referred to as source drive and target drive. A source drive is the drive you will be transferring information from. A target drive is the drive you will be transferring information to.

BATCH PROCESSING

Often you may find yourself entering the same sequence of commands over and over to perform some common task. With MS-DOS, you can put the command sequence into a special file called a batch file, and execute the entire sequence simply by entering the name of the batch file. "Batches" of your commands in such files are processed as if they were entered at the keyboard. Each batch file must be named with the .BAT extension, and is executed by entering the file name without its extension.

HOW TO CREATE AND EXECUTE A BATCH FILE

You can create a batch file by using the Video File Editor, the Line Editor (EDLIN) or the COPY command.

The MS-DOS command library contains a sub-set of batch processing commands. Among the more commonly used are REM and PAUSE. REM permits you to include remarks and comments in your batch files without these remarks being executed as commands. PAUSE prompts you with an optional message and permits you to either continue or abort the batch process at a given point.

Batch processing is useful if you want to execute several MS-DOS commands with one batch command, such as when you format and check a new diskette. For example, a batch file for this purpose might look like this:

```
REM This is a file to check new diskettes
REM It is named NEWDISK.BAT
PAUSE Insert new diskette in drive B
FORMAT B:
CHKDSK B:
```

Place an unprotected working copy of your system diskette in drive A.

Make sure that you have the prompt A> and proceed as follows to create the example batch file:

STEP	IF you enter...	THEN...
1	COPY CON: NEWDISK.BAT	the computer awaits input from the keyboard (CON:)
2	REM This is a file to check new diskettes	''REM This is a file to check new diskettes'' is entered on the first line
3	REM It is named NEWDISK.BAT	''REM It is named NEWDISK .BAT'' is entered on the second line
4	PAUSE Insert new diskette in drive B	''PAUSE Insert new diskette in drive B'' is entered on the third line
5	FORMAT B:	''FORMAT B:'' is entered on the fourth line
6	CHKDSK B:	''CHKDSK B:'' is entered on the fifth line
7	**CTRL Z**	type **CTRL Z** the end-of-file character is entered on the sixth line
8	**ENTER**	press **ENTER** the file creation is complete and the message: **1 File(s) copied** appears on the screen. The file NEWDISK.BAT is created on the system diskette.

To execute this batch file, simply enter the file name without the extension:

```
NEWDISK
```

The result is the same as if each of the lines in the batch file were entered at the terminal as individual commands. That is, the first three commands are executed successively and the following messages are displayed on the screen:

```
A>NEWDISK
A>REM This is a file to check new diskettes
A>REM It is named NEWDISK.BAT
A>PAUSE Insert new diskette in drive B
Strike a key when ready ...-
```

Fig. 4-1 Sample Batch File Display

After striking a key, the diskette in drive B is formatted. You will then be asked if you wish to format another diskette. Following a negative reply, the diskette will be checked.

Remarks

1. Only the file name should be entered to execute the batch file. Do not enter the file name extension.

2. Do not name batch files with internal command names.

3. If you name batch files with external command names, will be executed in preference to the .BAT file, .EXE or .COM file.

4. If you press **CTRL C** or **CTRL BREAK** while in batch mode, this prompt appears:

   terminate batch job (Y/N)?

   If you press **Y**, the remainder of the commands in the batch file are ignored and the system prompt appears.

   If you press **N**, only the current command is terminated and batch processing continues with the next command in the file.

5. If you remove the diskette containing a batch file being executed, MS-DOS prompts you to insert it again so the next command can be read.

6. The last command in a batch file may be the name of another batch file. This allows you to call one batch file from another, when the first is finished. However there is no return to the calling batch file.

7. Input and Output can be redirected (the ''<'', ''>'', ''>>'') symbols. See later in this chapter for more information.

THE AUTOEXEC.BAT FILE

An AUTOEXEC.BAT file is a batch file that allows you to automatically execute programs when you start MS-DOS. Automatic Program Execution is useful when you want to run a specific package (for example, Multiplan) under MS-DOS, and when you want MS-DOS to execute a batch program automatically each time you start the system.

When you start MS-DOS, the command processor searches the MS-DOS system diskette for a file named AUTOEXEC.BAT. The AUTOEXEC.BAT file is a batch file that is automatically executed each time you start the system.

The AUTOEXEC.BAT file is created in exactly the same way as any other batch file. It must, however, reside in the root directory of the MS-DOS system disk.

Example

If your AUTOEXEC.BAT file contains the following:

```
DATE
TIME
GWBASIC
```

then on initializing your system the date and time prompts will appear and the system will automatically enter GWBASIC.

BATCH FILES WITH REPLACEABLE PARAMETERS

You may want commands within a batch file to have replaceable parameters. For example, if your batch file contains a COPY command, you may wish to supply a different parameter to the COPY command each time you run the batch file. You can do this by specifying dummy parameters to the commands within the batch file. These parameters, named %0 to %9, can be replaced by values supplied when the batch file executes. For example, you may have created the following batch file named "MYFILE.BAT":

```
COPY %1.MAC %2.MAC
TYPE %2.TXT
TYPE %0.BAT
```

To execute this file you must enter the file name without extension, which is the value for parameter %0, followed by the replacement values for %1 and %2. For example, if you type:

```
MYFILE A:PROG1 B:PROG2
then press the ENTER key
```

then:

- %0 is replaced by "MYFILE"
- %1 is replaced by "A:PROG1"
- %2 is replaced by "B:PROG2"

The effect is to execute the following sequence:

```
COPY A:PROG1.MAC B:PROG2.MAC

TYPE B:PROG2.TXT

TYPE MYFILE.BAT
```

Remarks

1. Up to 10 dummy parameters (%0-%9) can be specified in this way. Refer to the SHIFT command if you wish to specify more than 10 dummy parameters.

2. If you use the percent sign as part of a file name within a batch file, you must enter it twice. For example, to specify the file ABC%.EXE, you must enter it as ABC%%.EXE in the batch file.

INPUT AND OUTPUT

MS-DOS normally assumes that input comes from the keyboard and that output goes to the screen. However, the flow of command input and output can be redirected. Input can come from a file rather than the keyboard, and output can go to a file or to a printer instead of to the screen. In addition, ''pipes'' can be created that allow output from one command to become the input to another. Redirection and pipes are discussed in the next sections.

REDIRECTING YOUR OUTPUT

Most commands produce output that is sent to the screen. You can send this information to a file by using a greater-than sign (>) in your command. For example, the command:

```
DIR
```

displays a directory listing of the current directory on the screen. The same command can send this output to a file named MYFILES instead of the screen by designating the output file in the command line:

```
DIR >MYFILES
```

If the file MYFILES does not already exist, MS-DOS creates it and stores your directory listing in it. If MYFILES already exists, MS-DOS overwrites what is in the file with the new data.

Two greater-than signs (>>) can be used to tell MS-DOS to append the output of the command (such as a directory listing) to the end of a specified file. For example, the command:

```
DIR >>MYFILES
```

appends your directory listing to a currently existing file named MYFILES. If MYFILES does not exist, it is created.

REDIRECTING YOUR INPUT

It is often useful to have input for a command come from a file rather than from the keyboard. This is possible in MS-DOS by using a less-than sign (<) in your command. For example, the command:

```
SORT <NAMES >LIST1
```

sorts the file NAMES and sends the sorted output to a file named LIST1.

FILTERS

A filter is a command that reads your input, transforms it in some way, and then sends the output, usually, to the screen or to a file. In this way, the data is said to have been "filtered" by the program. Since filters can be put together in many different ways, a few filters can take the place of a large number of specific commands.

MS-DOS filters include FIND, MORE, and SORT. Their functions are described below:

FIND Searches for a particular string of text in a file.

MORE Takes standard output and displays it, one screen at a time.

SORT Sorts text.

Refer to Chapter 5 for details of these commands.

You can see how these filters are used in the next section.

COMMAND PIPING

If you want to give more than one command to the system at a time, you can "pipe" commands to MS-DOS. For example, you may occasionally need to have the output of one program sent as the input to another program. A typical case would be a program that produces output in columns. You might want to have this columnar output sorted.

Piping is done by separating commands with the pipe separator, which is the vertical bar symbol (|). For example, the command:

```
DIR | SORT
```

will sort your directory into alphabetical order. The vertical bar causes all output generated on the left side of the bar to be sent to the right side of the bar for processing.

Piping can also be used when you want to send output to a file. If you want your directory sorted and sent to a new file (for example, DIREC.FIL), you could enter:

```
DIR | SORT >DIREC.FIL
```

MS-DOS will create a file named DIREC.FIL on your default drive. DIREC.FIL contains a sorted listing of the directory on the default drive, since no other drive was specified in the command. To specify a drive other than the default drive, enter:

```
DIR | SORT >B:DIREC.FIL
```

This sends the sorted data to a file named DIREC.FIL on drive B.

A pipeline may consist of more than two commands. For example:

```
DIR | SORT | MORE
```

will sort your directory, show it to you one screen at a time, and put **-MORE-** at the bottom of your screen when there is more output to be seen. Press any typing key to see the next screen.

Warning

If you use ''command piping'' do not write protect your default drive diskette.

COMMAND	CLASS	FUNCTION
TIME	I	Displays and sets the system time.
TREE	E	Displays all the directories and paths on the specified drive. It also has an option to list the files in each directory.
TYPE	I	Displays the contents of the specified file on the video screen.
VER	I	This command displays on your screen the version number of the MS-DOS system you are using.
VERIFY	I	Verifies writes to disk.
VOL	I	Displays the volume label of the disk in the specified or default drive.
XCOPY	E	Copies files and subdirectories.

MS-DOS 3.20 AND NETWORKING

MS-DOS 3.20 supports networking using the MS-Network extension software.

The file/record locking mechanism installed when using the following command only works when networking is active.

COMMAND	DESCRIPTION
SHARE	This program loads, then terminates, but stays resident in the Random Access Memory. It installs the file/record locking mechanism.

The following command(s) are useful for networking:

COMMAND	DESCRIPTION
ATTRIB	This command sets or resets the read-only attribute of a file or displays the attributes of that file. If any application opens a file with read/write permission, ATTRIB can set the file to read-only, allowing certain application programs to be run and shared over the network in compatibility mode.
COPY	This command can be used to copy files from a network disk to your own or to another network disk.
DIR	This command can be used to display information about files on network disks.
REPLACE	This command can be used to update or to add files to network drives. Use this command with the /A switch to restore deleted files, which have been previously backed-up with the XCOPY command.
XCOPY	This command can be used to recursively copy directory structures and the files contained within those directories, from or to network drives. Use this command with the /M switch to carry out incremental backups of network drives; as this switch turns off the archive bit.

Most MS-DOS commands can be used over the network. But **do not use:**

COMMAND	RESULT...
CHKDSK	the error message: **Cannot CHKDSK a Network drive.** If you suspect a problem contact the Network Manager.
DISKCOMP	the error message: **Cannot DISKCOMP to or from a Network drive.** Use COMP *.* for each relevant directory instead.
DISKCOPY	the error message: **Cannot DISKCOPY to or from a Network drive.** Use COPY *.* for each directory instead.
FDISK	the error message: **Cannot FDISK a Network Drive.**
FORMAT	the error message: **Cannot FORMAT a Network Drive.** The Network Manager can stop the server, do FORMAT then restart the server.
JOIN	the error message: **Cannot JOIN a Network Drive.**
LABEL	the error message: **Cannot LABEL a Network Drive.**
PRINT	You are advised to use NET PRINT instead of PRINT to print files over the network.

COMMAND	RESULT...
RECOVER	the error message: **Cannot RECOVER to a network drive.** The Network Manager can stop the server, do RECOVER, then restart the server.
SUBST	the error message: **Cannot SUBST to a network drive.**
SYS	the error message: **Cannot SYS to a network drive.** The Network Manager can stop the server, do SYS then restart the server.
VERIFY	This command will not work for files copied over a network. VERIFY ON will only cause verification of writes to local files.

ASSIGN

Instructs MS-DOS to route all requests for one drive to another drive.

Classification

External

[*d*:][*path*] **ASSIGN** [*drive1* = *drive2*] ...

Characteristics

The DISKCOPY command copies entire diskettes. Use COPY to copy files, or to copy to a different disk type than the source. For DISKCOPY, the diskettes must be of the same type, i.e. single, double, or quadruple density or high capacity. Also the source drive and the target drive must be able to read and write diskettes of the same type (see Chapter 1 for a table of Diskette and Drive compatibility). DISKCOPY automatically determines the number of sides to copy, based on the source drive and diskette. The target diskette is formatted or reformatted if necessary, during the copying. You can use the CHKDSK command to determine the capacity and DISKCOMP A: A: (comparing a disk with itself) to determine the format of the source diskette.

With DISKCOPY you can specify the same drives or you may specify different drives. If the drives designated are the same, a single-drive copy operation is performed. You are prompted to insert the disks at the appropriate times. DISKCOPY waits for you to press any key before continuing. If you omit both parameters, a single-drive copy operation will be performed on the default drive. If you omit the second parameter the default drive will be used as the target drive.

After copying, DISKCOPY prompts:

Copy complete
Copy another disk (Y/N)?

If you press **Y**, the next copy is performed on the same drives that you originally specified. You are prompted to insert the proper diskettes.

To end the copy, press **N**.

Error Codes

The following error codes are returned by DISKCOPY, these can be tested by IF ERRORLEVEL in a batch file.

0 Copied Successfully. The last diskcopy was completed with no errors.

1 Non-fatal read/write error. An un-recoverable but non-fatal read or write error occurred.

2 CTRL C error. The user entered CTRL C to terminate DISKCOPY.

3 Fatal hard error. DISKCOPY was unable to read the source disk or format the target disk.

4 Initialization error. There is not enough memory or the DISKCOPY command line syntax is incorrect or an invalid drive was specified.

Remarks

After an apparently successful DISKCOPY, you can carry out a DISKCOMP to compare the source and target diskettes.

If diskette errors are encountered during a DISKCOPY, you can run CHKDSK with the /F switch to try to correct errors on the source diskette. Use XCOPY or COPY *.* for each directory, instead of DISKCOPY to copy the suspect diskette.

Do not use DISKCOPY when a directory on the source disk is JOINED to another drive. DISKCOPY does not acknowledge an ASSIGNed drive: the DISKCOPY parameters refer to physical drives.

Characteristics

Use the *%char* variable in a command line you enter interactively. Use the *%%char* variable in a command line within a batch file. The *%char* or *%%char* variable is assigned the value of each item listed in turn. The command specified is activated for each resulting parameter.

You may include the wild cards * and ? in an item.

Remember to separate each item with a space, and to surround the complete item list by parentheses.

Examples

IF you enter in a batch file...	THEN...
FOR %%f IN (*.ASM) DO MASM %%f	All .ASM files are submitted to the assembler.
FOR %%f IN (report memo address) DO DEL %%f	The files report, memo and address are deleted.

Remarks

A FOR command cannot call another FOR command directly. However a FOR command can call a secondary command processor, which in turn processes another FOR command (see details of COMMAND for a full explanation).

For example:

FOR %x IN (1 2) DO COMMAND /C FOR %y IN (%x) DO REM %y

produces the output:

```
A> COMMAND /C FOR %y IN (1) DO REM %y
A> REM 1
A>
A> COMMAND /C FOR %y IN (2) DO REM %y
A> REM 2
```

FORMAT

Formats a disk to receive MS-DOS files. This command has been extended to format 2.0 MB (unformatted) 3 1/2 inch floppy disks in 1.44 MB floppy disk drives to 1.44 MB. With the new option switches "/N" and "/T" this command can also format 1.0 MB (unformatted) 3 1/2 inch disks in 1.44 MB drives to 720 KB formatted.

Classification

External, Non-network

[*d*:][*path*] **FORMAT** *drive*: [/1] [/S] [/O] [/V] [/8] [/4]

[/N:*sectors*] [/T:*tracks*]

Where

SYNTAX ELEMENT	MEANING
d	Specifies the drive where FORMAT is to be found.
path	Specifies the directory where FORMAT is to be found.

SYNTAX ELEMENT	MEANING
drive	The name of the drive that contains the disk.
sectors	The number of sectors per track to format. See the description of the /N switch.
tracks	The number of tracks to format. See the description of the /T switch.

Characteristics

You must run FORMAT on any new diskette you wish to use with MS-DOS. Any information already on the diskette is destroyed.

FORMAT places a bootstrap loader directory and file allocation table at the beginning of the diskette. It also checks for any faulty sectors on the diskette.

If you use the FORMAT command on a hard disk it will format the logical drive specified. If you are formatting an existing formatted logical drive on a hard disk, FORMAT prompts you with the following message:

Enter current Volume Label for drive (*x*:)

This is a security feature, to prevent you accidentally formatting an existing formatted logical drive. However if that logical drive has no Volume Label, press **ENTER** in response to the message. If the volume label that you enter does not match the label on the hard disk, FORMAT displays the message:

Invalid Volume ID Format failure

Otherwise Format continues:

WARNING, ALL DATA ON NON-REMOVABLE DISK DRIVE *x*:
WILL BE LOST!
Proceed with Format (Y/N)?

If you want to format your hard disk, type **Y** and press the **ENTER** key. If you do not want to format your hard disk, type **N** and press the **ENTER** key.

Switch options available with the FORMAT command have the following effect:

SWITCH	MEANING
/1	Formats a diskette single-sided. You would use this option for preparing 180 Kbyte diskettes on a double sided drive (or 160 Kbyte diskette if the /8 option is also specified). This option is not valid on a 1.2 MB, 3 1/2 inch, or hard disk.
/S	Copies the hidden system files and COMMAND.COM to the disk being formatted.
/O	Can only be used in conjunction with the /8 option to leave a place in the directory for the operating system of MS-DOS version 1.1. But the operating system is not placed on the disk. Note: This option causes the FORMAT program to take significantly longer.
/V	Allows you to enter a volume label. The FORMAT command issues a prompt that enables you to enter a unique volume label of up to 11 characters. This label will appear in subsequent directory listings.
/8	Formats diskettes 8 sectors per track instead of the default. 9 sectors per track. Diskettes formatted in this manner are compatible with MS-DOS Ver. 1.XX.
/4	Formats 48 tpi diskettes in High Capacity drives. Note: Diskettes formatted with this switch cannot be reliably used in Normal Capacity drives.
/N:*sectors*	Only use this option for formatting 720 KB 3 1/2 inch diskettes in a 1.44 MB drive. To format a 720 KB disk in a 1.44 MB drive enter FORMAT with /N:9 and /T:80 options set.
/T:*tracks*	Only use this option for formatting 720 KB 3 1/2 inch diskettes in a 1.44 MB drive. To format a 720 KB disk in a 1.44 MB drive enter FORMAT with /N:9 and /T:80 options set.

Note
If you choose the /N option, then the /T option must be entered.

If you choose the /T option, then the /N option must be entered. You cannot use the /N and /T option switches for formatting a hard disk.

Remarks

Refer to the section on ''Disks'', in Chapter 1 for charts of ''Diskette Capacities'' and ''Diskette Type Compatibility in Different Capacity Drives''.

Unless you use a switch to specify otherwise, the default format depends on the diskette type and the drive capacity.

Example

IF you enter...	THEN...
FORMAT B: /S	the diskette in drive B is formatted and operating system files are copied onto it.
FORMAT A: /N:9 /T:80	the 1.0 MB (unformatted) disk in the ''A:'' drive is formatted to a capacity of 720 KB in a 1.44 MB 3 1/2 inch drive.

Remarks

For diskette drives, FORMAT prompts you with a message such as:

Insert new diskette for drive B:
and strike ENTER when ready

When you have struck **ENTER** to continue, MS-DOS formats the disk cylinder by cylinder and displays the following information:

Head: *x* **Cylinder:** *y*

Where the head-value can be 0 or 1, and the cylinder-value increases from 0 to the number of cylinders formatted. When format has finished you will receive a message such as:

Format complete

362496 bytes total disk space
362496 bytes available on disk

Format another (Y/N)?

Press **Y** to format another; **N** to return to MS-DOS.

If you have 3 1/2 inch disk drives the operating system may need configuring to handle this media. If both the "A:" and "B:" are 3 1/2 inch drives, place the following declarations in your CONFIG.SYS:

DRIVPARM = /D:0 /F:2

DRIVPARM = /D:1 /F:2

(/D:0 indicates drive A:, /D:1 indicates drive B:, /F:2 indicates 720KB capacity.) After changing the CONFIG.SYS file your computer must be re-bootstrapped. See the "MS-DOS Software Installation Guide" for more details.

Error Codes

The following error codes are returned by FORMAT, these can be tested by IF ERRORLEVEL in a batch file:

0 Normal completion

3 Terminated by user (**CTRL BREAK** or **CTRL C**)

4 Fatal Error

5 **N** response to hard disk prompt, **Proceed with Format (Y/N)?**

GOTO

Jumps to a specified position in a batch file.

Classification

Internal

GOTO *label*

IF

Causes conditional execution of a command in a batch file.

Classification

Internal

IF [NOT] *condition command*

Where

SYNTAX ELEMENT	MEANING
condition	One of the valid conditions listed below.
command	The command you wish to conditionally execute. If the command is external, it may optionally be preceded by the drive where it is to be found and/or the path leading to the directory where it is to be found.

Characteristics

The specified command is only executed if the condition is true. If it is false the command is ignored. Valid conditions are as follows:

CONDITION	MEANING
EXIST [*d*:][*path*] *filename*	The command is executed only if the specified file exists. on drive *d*:, and in the directory to which the path leads. The default drive is searched if *d*: is not specified. The current directory is searched if path is not specified.
string1 = = *string2*	The command is executed only if the two strings are identical after parameter substitution. The case of the characters in *string1* and *string2* is significant.
ERRORLEVEL *number*	The command is executed only if the previous program executed had an exit code of the specified number, or higher.
NOT ERRORLEVEL *number*	The command is executed only if the previous program executed had an exit code of less than the specified number.

PRINT

Queues text files for background printing, while other MS-DOS commands are obeyed.

Classification

External

Syntax 1

The first time PRINT is called

[*d*:][*path*] **PRINT** [**/D:***device*] [**/B:***buffsize*] [**/U:***busyticks*] [**/M:***maxticks*] [**/S:***timeslice*] [**/Q:***queuesize*] [[*pathname*]...]

Syntax 2

Subsequent calls to PRINT

[*d*:][*path*] **PRINT** [[**/C/P**] [[*pathname*]...] [**/C/P**]...]

Syntax 3

Subsequent call to terminate PRINT

[*d*:][*path*] **PRINT /T**

Where

SYNTAX ELEMENT	MEANING
d	Specifies the drive where PRINT is to be found.
path	Specifies the directory where PRINT is to be found.
pathname	The file specification of a file to be printed, optionally preceded by the drive and the path to the directory where the file is to be found.
/D:*device*	Use to specify the print device. If not used PRINT will ask for a print device.
/B:*buffsize*	Use to set the internal print buffer size in bytes. The normal size is 512 bytes. Increasing the size may increase performance.
/U:*busyticks*	Specifies the number of MS-DOS clock ticks that PRINT will wait if the printer is busy. Otherwise PRINT gives up its timeslice. The default is 1 tick.
/M:*maxticks*	Specifies how many MS-DOS clock ticks print can have to print a file. *maxticks* can be from 1 to 255 clock ticks (the default is 2).
/S:*timeslice*	Specifies the time slice value. *timeslice* can be from 1 to 255 (the default is 8). The lower the value the higher the priority of the print queue.
/Q:*queuesize*	Specifies the number of files allowed in the print queue. *queuesize* can be from 1 to 32 (the default is 10).

Characteristics

You may use global and wildcard characters.

When you run PRINT for the first time in a terminal session, you are prompted as follows:

Name of list device [PRN:]

Type the name of a valid printer device driver, or simply press **ENTER** to accept the default line printer device PRN:.

The following switches are possible with this command:

SWITCH	MEANING
/T	TERMINATE: this switch cancels all files in the print queue (those waiting to be printed). A message to this effect will be printed.
/C	CANCEL: This switch turns on cancel mode. The preceding filespec and all following filespecs will be suspended in the print queue until /P switch is encountered on the command line.
/P	PRINT: This switch turns on print mode. The preceding filespec and all following filespecs will be added to the print queue until a /C switch is encountered on the command line.

PRINT with no parameters displays the contents of the print queue on your screen without affecting the queue.

Examples

IF you enter...	THEN...
PRINT /T	the print queue is emptied.
PRINT /T *.ASM	the print queue is emptied then all the *.ASM files are queued to the printer.
PRINT TEMP1/C TEMP2 TEMP3	the three files indicated are removed from the print queue.
PRINT TEMP1/C TEMP2/P	TEMP1 is removed from the queue, whereas TEMP2 is added.

Warning

When PRINT is active do not print screen (**SHIFT PRT SCR**) or turn the printer echo on (**CTRL PRT SCR**).

PROMPT

Sets the MS-DOS command prompt.

Classification

Internal

PROMPT [{*meta-character*|*character*}...]

Where

SYNTAX ELEMENT	MEANING
meta-character	A special character you wish to use to create the MS-DOS prompt, preceded by a $ sign.
character	A character you wish to appear in your prompt, but this cannot be a $ or any of the characters described in the "MEANING" column of the following table.

Characteristics

If no argument is entered, the prompt will be set to the default prompt, which is the default drive designation plus the > symbol. You can set the prompt to something different such as the current time, by using the meta-characters indicated below.

The following meta-characters can be used in the prompt command

to specify special prompts. They must all be preceded by a dollar sign ($) in the prompt command:

SPECIAL CHARACTER	MEANING
$	The '$' character.
t	The time.
d	The date.
p	The default drive and the path to the current directory.
v	The version number.
n	The default drive.
g	The '>' character.
l	The '<' character.
b	The '|' character.
_	A carriage return-linefeed sequence.
s	A space (leading only).
h	A backspace.

Characteristics

RMDIR removes a directory that is empty apart from the . and .. special files. If the directory contains subdirectories or files, these must first be removed by means of the RMDIR or DEL command respectively.

You may either enter RMDIR or RD to invoke this command.

Example

IF you enter...	THEN...
RMDIR C:\BIN\USER\JOE	the specified empty directory is removed, on the C: drive.

SELECT

Formats the target disk and installs MS-DOS, configured for your selected country and keyboard.

Classification

External

[*d*:][*path*] **SELECT** [[*s-drive*:] *t-drive*:[*t-path*]] *country-code keyboard-code*

Where

SYNTAX ELEMENT	MEANING
d	Specifies the drive where SELECT is to be found.
path	Specifies the directory where SELECT is to be found.
s-drive	Specifies the source drive, which can only be A: or B:. If this parameter is not specified the default source drive is A:.
t-drive	Specifies the target drive. If this parameter is not specified the default target drive is B:. The source drive and the target drive must be different.
t-path	Specifies the target directory. If this is not specified, the root directory is the default.
country-code	A three digit number which is the telephonic international country code.
keyboard-code	A two character alpha code indicating your national keyboard.

Note

See the "MS-DOS Software Installation Guide" for more details.

Remarks

The case of the key is converted to uppercase. The case of the value is left in the case input. Be careful, because some programs require values in uppercase, these values must be input in uppercase.

For example:

IF you enter...	THEN...
SET tty = vt52	in the environment tty -> TTY
SET	PATH = COMSPEC = A:\COMMAND.COM TTY = vt52

If the program expects VT52 in uppercase vt52 in lowercase will not be recognized.

SHARE

Installs network file and record locking. It also installs a resident facility which checks for diskette removal during reading and writing to diskettes.

Classification

External

[*d*:][*path*] **SHARE** [**/F:** *memory-space*] [**/L:** *locks*]

Where

SYNTAX ELEMENT	MEANING
d	Specifies the drive where SHARE is to be found.
path	Specifies the directory where SHARE is to be found.
/F:memory-space	When this switch is used, the memory-space parameter indicates how much memory space is reserved for recording file sharing information. Each open file should be allocated space for its pathname plus eleven bytes; so the space allocated should be between 32 bytes and 74 bytes per file. 74 bytes will allow for a full-length pathname of 63 characters. The default memory-space for file-sharing information is 2048 bytes.
/L:locks	When this switch is used, memory space is allocated for the maximum number of locks it is possible to apply to a file. The default value for the number of locks it is possible to apply is 20.

Characteristics

If used it should be included in the system disk's AUTOEXEC.BAT file. Once the command has been called the support utility becomes resident. It takes about 5K bytes of memory (with the default switch settings).

After SHARE is resident, all read and write requests are checked for lock violations. See the "MS-DOS System Programmer Guide" for details on file locking and unlocking.

Collating Sequence

So as to be able to sort National Character Sets the following character mappings are effected:

ORIGINAL CHARACTER	MAPPED CHARACTER
Ç	C
Ü	U
é	E
â	A
ä	A
à	A
å	A
ç	C
ê	E
ë	E
è	E
ï	I
î	I
ì	I
Ä	A
Å	A
É	E
æ	A
Æ	A

ORIGINAL CHARACTER	MAPPED CHARACTER
ô	O
ö	O
ò	O
û	U
ù	U
ÿ	Y
Ö	O
Ü	U
¢	$
£	$
Y	$
Pt	t
f	$
á	A
í	I
ó	O
ú	U
ñ	N
Ñ	N
a	a
o	o
¿	?
⌐	⌐
¬	¬
1/2	1/2
1/4	1/4
¡	¡
«	,,
»	,,
β	S

SUBST M: C:\USR\MIKE

where MIKE is a directory. You would now be able to refer to the directory by using the alias "M:" instead of the path C:\USR\MIKE.

After substitution the command

DIR M:

could product the following display.

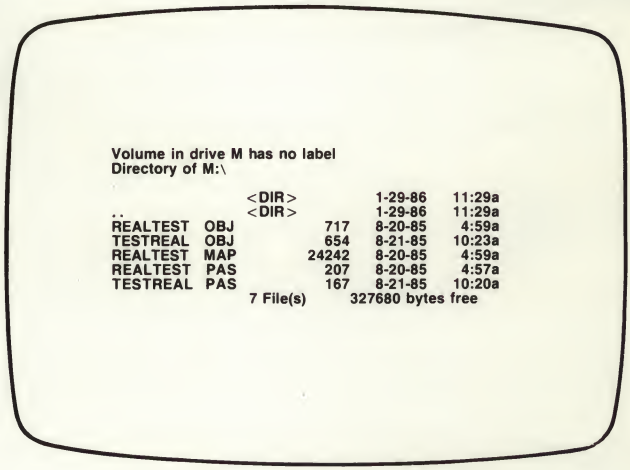

Fig. 5-6 Substituted Directory Display

Substituting is particularly useful for programs that do not recognise paths, or you can use a letter as shorthand for a long path.

To undo a substitution use SYNTAX 2.

In the above example:

SUBST M: /D

will undo the substitution.

Remarks

Never use the SUBST command and then use the following commands on the dummy drive or unpredictable results and/or error messages will occur.

ASSIGN
BACKUP
DISKCOMP
DISKCOPY
FDISK
FORMAT
JOIN
LABEL
PRINT
RESTORE

Pay attention to the substitutions in effect when using the following commands.

CHDIR
MKDIR
RMDIR
PATH

Switches for XCOPY are:

SWITCH	MEANING
/A	Causes XCOPY to copy source files that have their archive bit set. It does not modify the archive bit of the source file. Refer to the ATTRIB command for information on how to set the archive attribute.
/D	Causes XCOPY to copy source files that have been modified on or after the date specified by *mm-dd-yy*. Note that the date format may vary depending on the country code that you are using.
/E	Causes XCOPY to copy empty subdirectories. You must use this switch with the /S switch.
/M	This switch is similar to the /A switch since it copies archived files only; however, it turns off the archive bit in the source file. Refer to the ATTRIB command for information on how to set the archive attribute.
/P	Causes XCOPY to prompt you before copying each file: *target-filename* (Y/N)?
/S	Causes XCOPY to recursively copy lower level subdirectories and their files. Empty subdirectories are not copied unless the /E switch is used with this /S switch. If you omit the /S switch, XCOPY works only within a single directory.
/V	Causes XCOPY to verify each file as it is written to the target to make sure that the target files are identical to the source files.
/W	This switch causes XCOPY to wait before it starts copying files. This is useful for changing diskettes.

Characteristics

When this command is used without switches, it is the equivalent of simple or wildcarded file copy. When the /A or /M switch is used the command is useful for backing up disks, as an alternative to the BACKUP command. When the /S switch (and optionally the /E switch) is used with the source-directory being root (\), this command can copy whole disks; in contrast to COPY, which can only copy files, one directory at a time. When the /S switch (and optionally the /E switch) is used with the source-directory being a subdirectory, a directory sub-tree is copied.

Examples

```
ATTRIB +A C:\BIN

XCOPY C:\BIN A: /A
```

The above example copies the whole of the BIN directory on the hard disk to a diskette in drive A:; setting the archive bit in each file with ATTRIB prepares for the use of the /A switch. If there are too many files to fit onto the diskette in A:, use the /M switch instead as in the following example:

```
ATTRIB +A C:\BIN

XCOPY C:\BIN A: /M
```

When the target disk becomes full, XCOPY finishes and the following message is displayed:

Disk Full

Put another diskette into the A: drive and repeat:

```
XCOPY C:\BIN A: /M
```

Those files that had been copied onto the original diskette had had their archive bit turned off, so they will not be copied onto the second diskette. If the "Disk Full" message is displayed again, repeat the copy operation with fresh target diskettes, until no message is received. However, this technique will not cope with files that are too big to fit on the target diskette, in this case use the BACKUP command instead.

The following examples illustrate recursive copying. The source drives for both examples have their directory structure illustrated in the following figure:

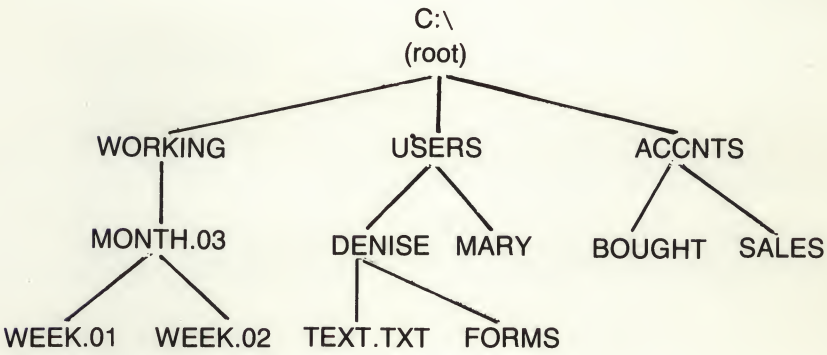

Fig. 5-7 Source Drive Directory Structure

If the target drive directory structure before copying is as illustrated in the following figure:

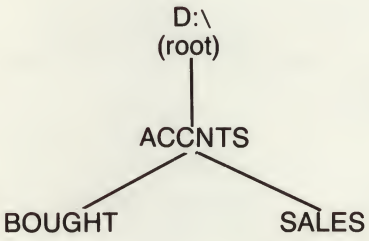

Fig. 5-8 Target Drive Directory Structure Before Copying

Example: The source and the target subdirectory trees have different structures:

```
XCOPY C:\USERS\*.* D: \ /S
```

The result on the target is to create subdirectories with the same names as those in the source directory tree being copied. All the files that exist in the source subdirectory and its subtree on "C:" will be copied into the directories of the same names on "D:". Note that empty subdirectories will not be created on the target unless the "/E" switch was specified. The resultant directory structure is illustrated in the following figure:

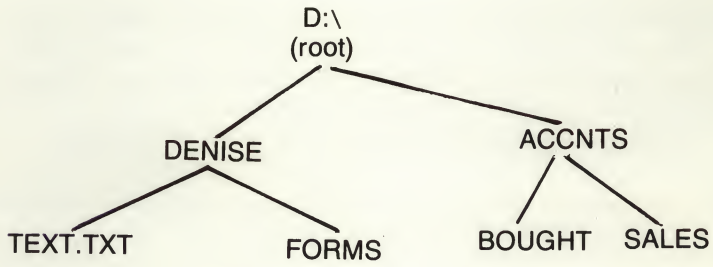

Fig. 5-9 Target Drive Directory Structure After Copying

Example: The source and target drives have the same structure:

```
XCOPY C:\ACCNTS\*.* D:\ACCNTS /S
```

The result on the target is to leave the Target Drive Directory Structure the same as before copying. All the files that exist in the source subdirectory and its subtree on C: will be copied into the directories of the same names on "D:".

Example: Copying From one directory to another:

```
XCOPY C:\WORKING D:\ARCHIVE /S/M
```

As the directory "ARCHIVE" does not exist on the target, it will be created. However "XCOPY" does not know whether the name "ARCHIVE" is intended to be a file or a directory. Therefore you will be asked:

Does ARCHIVE specify a file name or directory name on the target (F = file, D = directory) ?

Answer **D** as "ARCHIVE" is intended to be a directory.

The subdirectory tree of the directory "WORKING" will be copied and the subdirectories will retain the same names as those in the source directory. All files in WORKING and its subdirectories with their archive bit set, will be copied to the equivalent target directories. The resultant directory structure is illustrated in the following figure:

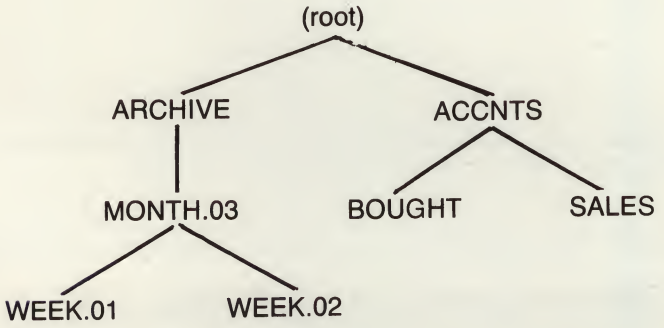

Fig. 5-10 The Target Directory Structure After Copying

Remarks

XCOPY does not provide for copying to or from reserved device names such as CON: or AUX:.

Q(QUIT)

Terminates the DEBUG program.

Q

Characteristics

The Quit command terminates the debugger without saving the file you are working on. Control is returned to MS-DOS command mode.

Example

IF you enter...	THEN...
Q	the DEBUG program terminates and returns you to MS-DOS command mode.

R(REGISTER)

Displays the hexadecimal contents of the registers and flag settings, or displays the contents of a specified register with the option to change that value, or displays the flag settings with the option of reversing any number of those settings.

R [*register-name*| **F**]

Where

SYNTAX ELEMENT	MEANING
register-name	Any valid register name whose contents are to be examined and optionally changed. This may be one of: AX DX SI ES IP BX SP DI SS CX BP DS CS
F	The flag settings are to be displayed and, optionally, changed.

DEC	HEX	CHARACTER
128	80	Ç
129	81	ü
130	82	é
131	83	â
132	84	ä
133	85	à
134	86	å
135	87	ç
136	88	ê
137	89	ë
138	8A	è
139	8B	ï
140	8C	î
141	8D	ì
142	8E	Ä
143	8F	Å

DEC	HEX	CHARACTER
144	90	É
145	91	æ
146	92	Æ
147	93	ô
148	94	ö
149	95	ò
150	96	û
151	97	ù
152	98	ÿ
153	99	Ö
154	9A	Ü
155	9B	¢
156	9C	£
157	9D	¥
158	9E	Pt
159	9F	f

DEC	HEX	CHARACTER
160	A0	á
161	A1	í
162	A2	ó
163	A3	ú
164	A4	ñ
165	A5	Ñ
166	A6	ª
167	A7	º
168	A8	¿
169	A9	⌐
170	AA	¬
171	AB	1/2
172	AC	1/4
173	AD	¡
174	AE	«
175	AF	»

DEC	HEX	CHARACTER
176	B0	▒
177	B1	▒
178	B2	▓
179	B3	│
180	B4	┤
181	B5	╡
182	B6	╢
183	B7	╖
184	B8	╕
185	B9	╣
186	BA	║
187	BB	╗
188	BC	╝
189	BD	╜
190	BE	╛
191	BF	┐

Tab. A-1 Extended ASCII Character Set (cont.)

DEC	HEX	CHARACTER	DEC	HEX	CHARACTER	DEC	HEX	CHARACTER	DEC	HEX	CHARACTER
192	C0	└	208	D0	╨	224	E0	α	240	F0	≡
193	C1	┴	209	D1	╤	225	E1	β	241	F1	±
194	C2	┬	210	D2	╥	226	E2	Γ	242	F2	≥
195	C3	├	211	D3	╙	227	E3	π	243	F3	≤
196	C4	─	212	D4	╘	228	E4	Σ	244	F4	⌠
197	C5	┼	213	D5	╒	229	E5	σ	245	F5	⌡
198	C6	╞	214	D6	╓	230	E6	µ	246	F6	÷
199	C7	╟	215	D7	╫	231	E7	τ	247	F7	≈
200	C8	╚	216	D8	╪	232	E8	Φ	248	F8	°
201	C9	╔	217	D9	┘	233	E9	Θ	249	F9	•
202	CA	╩	218	DA	┌	234	EA	Ω	250	FA	·
203	CB	╦	219	DB	█	235	EB	δ	251	FB	√
204	CC	╠	220	DC	▄	236	EC	∞	252	FC	n
205	CD	═	221	DD	▌	237	ED	∅	253	FD	2
206	CE	╬	222	DE	▐	238	EE	∈	254	FE	■
207	CF	╧	223	DF	▀	239	EF	∩	255	FF	(SPACE) (SP)

Tab. A-1 Extended ASCII Character Set (cont.)

NATIONAL VARIATIONS IN EXTENDED ASCII CODE (ISO 8-bit code)

For Denmark, Norway, Greece and Portugal certain characters are displayed differently. These characters and their decimal and hexadecimal codes are shown in the following table.

DEC	HEX	CHARACTER
128	80	Ç
129	81	ü
130	82	é
131	83	â
132	84	ä
133	85	à
134	86	å
135	87	ç
136	88	ê
137	89	ë
138	8A	è
139	8B	ï
140	8C	î
141	8D	ì
142	8E	Ä
143	8F	Å

DEC	HEX	CHARACTER
144	90	É
145	91	æ
146	92	Æ
147	93	ô
148	94	ö
149	95	ò
150	96	û
151	97	ù
152	98	ÿ
153	99	Ö
154	9A	Ü
155	9B	ø
156	9C	£
157	9D	Ø
158	9E	Ł
159	9F	I·

DEC	HEX	CHARACTER
160	A0	á
161	A1	í
162	A2	ó
163	A3	ú
164	A4	ñ
165	A5	Ñ
166	A6	õ
167	A7	Õ
168	A8	¿
169	A9	ã
170	AA	Ã
171	AB	ℓ
172	AC	'n
173	AD	¡
174	AE	3
175	AF	¤

DEC	HEX	CHARACTER
176	B0	▒
177	B1	▒
178	B2	▒
179	B3	┃
180	B4	┤
181	B5	╡
182	B6	╢
183	B7	╖
184	B8	╕
185	B9	╣
186	BA	‖
187	BB	╗
188	BC	╝
189	BD	╜
190	BE	╛
191	BF	┐

Tab. A-2 National Characters for Denmark and Norway

DEC	HEX	CHARACTER
192	C0	└
193	C1	┴
194	C2	┬
195	C3	├
196	C4	─
197	C5	┼
198	C6	╞
199	C7	╟
200	C8	╚
201	C9	╔
202	CA	╩
203	CB	╦
204	CC	╠
205	CD	═
206	CE	╬
207	CF	╧

DEC	HEX	CHARACTER
208	D0	╨
209	D1	╤
210	D2	╥
211	D3	╙
212	D4	╘
213	D5	╒
214	D6	╓
215	D7	╫
216	D8	╪
217	D9	┘
218	DA	┌
219	DB	■
220	DC	▄
221	DD	▌
222	DE	▐
223	DF	▀

DEC	HEX	CHARACTER
224	E0	α
225	E1	β
226	E2	Γ
227	E3	π
228	E4	Σ
229	E5	σ
230	E6	µ
231	E7	τ
232	E8	Φ
233	E9	Θ
234	EA	Ω
235	EB	δ
236	EC	∞
237	ED	∅
238	EE	∈
239	EF	∩

DEC	HEX	CHARACTER
240	F0	≡
241	F1	±
242	F2	≥
243	F3	≤
244	F4	⌠
245	F5	⌡
246	F6	÷
247	F7	≈
248	F8	°
249	F9	∙
250	FA	·
251	FB	√
252	FC	n
253	FD	2
254	FE	■
255	FF	(SPACE) (SP)

Tab. A-2 National Characters for Denmark and Norway (cont.)

DEC	HEX	CHARACTER
128	80	Ç
129	81	ü
130	82	é
131	83	â
132	84	ã
133	85	à
134	86	Á
135	87	ç
136	88	ê
137	89	Ê
138	8A	è
139	8B	Í
140	8C	Ô
141	8D	ì
142	8E	Ã
143	8F	Â

DEC	HEX	CHARACTER
144	90	É
145	91	À
146	92	È
147	93	ô
148	94	õ
149	95	ò
150	96	Ú
151	97	ù
152	98	Ì
153	99	Õ
154	9A	Ü
155	9B	¢
156	9C	£
157	9D	Ù
158	9E	Pt
159	9F	Ó

DEC	HEX	CHARACTER
160	A0	á
161	A1	í
162	A2	ó
163	A3	ú
164	A4	ñ
165	A5	Ñ
166	A6	ª
167	A7	º
168	A8	¿
169	A9	Ò
170	AA	¬
171	AB	1/2
172	AC	1/4
173	AD	¡
174	AE	«
175	AF	»

DEC	HEX	CHARACTER
176	B0	▒
177	B1	▒
178	B2	▓
179	B3	│
180	B4	┤
181	B5	╡
182	B6	╢
183	B7	╖
184	B8	╕
185	B9	╣
186	BA	║
187	BB	╗
188	BC	╝
189	BD	╜
190	BE	╛
191	BF	┐

Tab. A-4 National Characters for Portugal

DEC	HEX	CHARACTER
192	C0	└
193	C1	┴
194	C2	┬
195	C3	├
196	C4	─
197	C5	┼
198	C6	╞
199	C7	╟
200	C8	╚
201	C9	╔
202	CA	╩
203	CB	╦
204	CC	╠
205	CD	═
206	CE	╬
207	CF	╧

DEC	HEX	CHARACTER
208	D0	╨
209	D1	╤
210	D2	╥
211	D3	╙
212	D4	╘
213	D5	╒
214	D6	╓
215	D7	╫
216	D8	╪
217	D9	┘
218	DA	┌
219	DB	■
220	DC	▄
221	DD	▌
222	DE	▐
223	DF	▀

DEC	HEX	CHARACTER
224	E0	α
225	E1	ß
226	E2	Γ
227	E3	π
228	E4	Σ
229	E5	σ
230	E6	µ
231	E7	τ
232	E8	Φ
233	E9	Θ
234	EA	Ω
235	EB	δ
236	EC	∞
237	ED	∅
238	EE	∈
239	EF	∩

DEC	HEX	CHARACTER
240	F0	≡
241	F1	±
242	F2	≥
243	F3	≤
244	F4	⌠
245	F5	⌡
246	F6	÷
247	F7	≈
248	F8	°
249	F9	•
250	FA	·
251	FB	√
252	FC	n
253	FD	2
254	FE	▮
255	FF	(SPACE) (SP)

Tab. A-4 National Characters for Portugal (cont.)

EXTENDED KEYBOARD CODES (FOR USA KEYBOARDS)

Certain keys and key combinations do not produce ASCII code (one byte). Instead they produce two bytes; the first byte is always zero. This zero value indicates an extended keyboard code. The following table shows the value of the second byte, when these key(s) are pressed.

DEVICE

Installs a device driver.

DEVICE = *filespec*

Where

SYNTAX ELEMENT	MEANING
filespec	The file containing the device driver.

Characteristics

If *filespec* is the file ANSI.SYS, the escape sequences described in Appendix B are supported.

If *filespec* is DRIVER.SYS, refer to Appendix G for further details.

If *filespec* is VDISK.SYS, refer to Appendix F for further details.

If *filespec* is OLICACHE.SYS refer to Appendix H for further details.

Alternatively, you may enter the file name of any device driver written for your system.

Important

The device driver file must be in the root directory of the drive used for bootstrapping the computer.

Note: DEVICE = *filespec* can be repeated on several lines of the CONFIG.SYS file with different device driver parameters.

DRIVPARM

Enables you to override the default settings for predefined block devices.

DRIVPARM = /D: *drive-no* **[/C] [/F:** *form-factor*] **[/H:** *heads*] **[/N] [/S:** *sectors*] **[/T:** *tracks*]

Where

SWITCH	PARAMETER	MEANING
/D	*drive-no*	Specifies the logical drive number between 0 and 255. So 0 = A: 1 = B: 2 = C: etc.
/C		Disk change support is required. See "SHARE" in Chapter 5 for more details.
/F	*form-factor*	Specifies the media format and kind to be supported: 0 320/360 KB 1 1.2 MB 2 720 KB 3 8 inch single density 4 8 inch double density 5 Hard Disk 6 Tape Drive 7 Other

DEVICE AND DISK DRIVE ERRORS

Errors may occur when reading from or writing to devices and disk drives. These errors cause the system to stop and output a message of this form:

type* error *action unit
Abort, Retry, Ignore?

Where

type	Specifies the possible causes of device or disk drive failure. The Table D-1 contains the message type.
action	Can be **reading** or **writing**.
unit	Can be either: **device *device-name*** or **drive *drive-letter*** It specifies the device or disk drive in error.
device-name	See the section ''Reserved Device Names'' in Chapter 3 for a list of device-names.
drive-letter	A single letter in the range ''A'' through ''Z''.

Response

When you receive one of these messages, do one of the following:

Enter **A** for Abort. The system ends the program that requested the read or write.

Enter **R** for Retry. The system tries the read or write operation again.

Enter **I** for Ignore. The system ignores the error and attempts to continue the program. (This method may cause loss of data).

Important

For disk drive error messages, do not change disks before responding with **A**, **R** or **I**. The only exception is "Invalid Disk Change".

The following table lists possible causes of device and disk drive errors; these are described along with the rest of the error messages in the section "Error Messages In Alphabetical Order".

Bad call format
Bad command
Bad unit
Data
Disk error
FCB unavailable
General Failure
Invalid Disk Change
Lock Violation
No paper
Non-DOS disk
Not ready
Read fault
Sector not found
Seek
Sharing buffer exceeded
Sharing Violation
Write fault
Write protect

Tab. D-1 Possible Causes of Device and Disk Drive Errors

Examples

The following example is a typical error message displayed when the printer connected to the computer is switched off:

Not ready error writing device PRN
Abort, Retry, Ignore?

The following example is a typical error message displayed when there is no floppy diskette in the disk drive:

Not ready error reading drive A
Abort, Retry, Ignore?

The best response to this message is **I** (for Ignore).

The computer should output the message:

Current drive is no longer valid]

Respond by entering the letter followed by a colon of a valid disk drive, for example C:. The drive you enter will become the current drive.

ERROR MESSAGES IN ALPHABETICAL ORDER

The following list contains a description of the possible cause and meaning of the message and where possible suggests remedial action.

ERROR MESSAGE	MEANING
Abort edit (Y/N)? (EDLIN)	MS-DOS displays this message when you choose the Q (Quit) command in EDLIN. The Quit command exits the editing session without saving any editing changes. Specify **Y** (for "Yes") or **N** (for "No").
Access denied (MS-DOS)	MS-DOS displays this message when you tried to write to or delete a file marked as read only. If you really want to carry out this action, use the ATTRIB command to give the file a read/ write attribute.
All files canceled by operator (PRINT)	MS-DOS displays this message when you specify the **/T** switch with the PRINT command.
All partitions are currently in use. (FDISK)	Self-explanatory.
All specified files are contiguous (CHKDSK)	All files are allocated contiguously on the disk without fragmentation.
Allocation error size adjusted (CHKDSK)	The size of the file indicated in the directory was not consistent with the amount of data actually allocated to the file. Adjustment actually takes place only, if you specify the /F switch with CHKDSK, the file is truncated at the end of the last valid cluster.

ERROR MESSAGE	MEANING
Ambiguous switch:*z* (LINK)	The characters in *z* identify more than one linker parameter.
Amount read less than size in header (EXE2BIN)	The file is smaller than its header indicates. Recompile (or reassemble) and relink the program.
An internal failure has occurred (LINK)	The linker program has failed. Report the conditions of the failure to your Olivetti Dealer.
Attempt to access data outside of segment bounds, possibly bad object module (LINK)	An invalid object file has been specified.
Attempt to write on write-protected diskette (FORMAT)	You cannot format a write-protected diskette. Use another disk or remove the write-protection tag.
Backup file sequence error (RESTORE)	The file being restored is backed up on more than one diskette. The wrong diskette in the sequence has been inserted.
Bad call format (device error)	A request header of incorrect length was passed to a device driver. Contact your Olivetti dealer.

ERROR MESSAGE	MEANING
Bad command (device error)	A device driver issued an incorrect command to the device specified in the error message.
Bad command or file name (MS-DOS)	You typed neither an internal command nor an external command (executable filename). You either mistyped the command or the file does not exist in the specified disk directories.
Bad numeric parameter (LINK)	The value specified with the /STACK parameter is not a valid numeric constant.
Bad or missing Command Interpreter (MS-DOS)	The MS-DOS disk being loaded does not contain the file COMMAND.COM in the root directory. This message may also appear if an error occurs during loading of the system disk or if the COMSPEC = *parameter* does not point to a directory containing COMMAND.COM.
Bad or missing *filename* (MS-DOS)	One of the following conditions occurred during startup: The device driver named in the DEVICE = *parameter* does not exist in CONFIG.SYS. A break address has been set which is out of bounds for the machine. An error occurred during loading of the driver.

ERROR MESSAGE	MEANING
Cannot open response file (LINK)	The specified response file does not exist.
Cannot open temporary file (LINK)	The directory or disk is full, hence the linker cannot create the VM.TMP file. Insert a new disk. Do not remove the disk that will receive the List.MAP file.
Cannot perform a cyclic copy (XCOPY)	You have used the /S switch and have specified a target directory, which is a subdirectory of the source.
Cannot recover . entry, processing continued (CHKDSK)	The . entry (working directory) is defective.
Cannot recover .. entry, processing continued (CHDSK)	The .. entry (parent directory) is defective.
Cannot RECOVER a Network drive (RECOVER)	You cannot recover files on drives that are redirected over the Network.
CHDIR .. failed, trying alternate method (CHKDSK)	In traveling the tree structure, CHKDSK was not able to return to a parent directory. It will try to return to that directory by starting over at the root and traveling down.
COM port does not exist (MODE)	You have specified an invalid "COM" port

ERROR MESSAGE	MEANING
Compare Error(s) (DISKCOMP)	Different information has been found on one or more disk locations.
Compare error at offset *XXXXXXX* (COMP)	While comparing two files, different values were found at offset *XXXXXXXX* (hexadecimal). The values found are also displayed (in hexadecimal).
Compare more files (Y/N)? (COMP)	Answer **Y** if you wish to compare more files, otherwise enter **N**.
Contains XXX noncontiguous blocks (CHKDSK)	This message indicates that your files are fragmented. Fragmented files take longer to read COPY badly fragmented files to a newly formatted disk. Using the new disk will result in faster reading of the files.
Content of destination lost before copy (MS-DOS)	A file to be used as a source file to the Copy command has been overwritten prior to completion of the copy. Example: COPY F1 + F2 F2 destroys F2 before it can be copied.
Current drive is no longer valid> (COMMAND.COM)	If you have set your prompt to include the $p parameter and have specified an invalid drive you will first get the message: "Not ready error reading drive *drive-letter*" Abort, Retry, Ignore? Press **I** in response and the Current drive message is displayed. Type in a valid *drive-letter*: to change the current drive to a valid drive.

ERROR MESSAGE	MEANING
Data error (device error)	Data could not be read/written correctly because of a faulty disk.
DEVICE Support Not Present (DISKCOMP) (DISKCOPY)	One of the floppy disk drives specified in the DISKCOMP command does not support MS-DOS Ver. 3.2 device control.
df Error (DEBUG)	Conflicting codes have been specified for a single flag. A flag can be changed only once for each Register (RF) command.
Directory entries adjusted (VDISK)	VDISK has adjusted the number of directory entries in the parameters of DEVICE = VDISK.SYS in the CONFIG.SYS command.
Directory error in TREE (TREE)	Self-explanatory.
Directory is joined, tree past this point not processed. (CHKDSK)	CHKDSK will not process directories which are joined.
Directory is totally empty, no . or .., tree past this point not processed. (CHKDSK)	The specified directory does not contain references to working and parent directories. Delete the specified directory and recreate it.
Directory not empty (JOIN)	You can only JOIN onto a directory which is empty.

ERROR MESSAGE	MEANING
Disk error (device error)	An error has occurred reading from or writing to a disk.
Disk error reading FAT *copy* (CHKDSK)	An error occurred while CHKDSK was trying to read the file allocation table *copy* has the value 1 or 2.
Disk error writing FAT *copy* (CHKDSK)	An error occurred while CHKDSK was trying to update the file allocation table *copy* has the value 1 or 2.
Disk full. Edits lost (EDLIN)	EDLIN was not able to save your file due to lack of disk space.
Disk unsuitable for system disk (FORMAT)	The diskette contains a defective track where MS-DOS files must reside. The disk may only be used for data.
Diskette bad or incompatible (COPY)	You will get this message, if there is a read error from your source diskette or if there is a write error to your target diskette.
Divide overflow (MS-DOS)	A divide by zero was attempted, or an internal logic error has occurred. The system continues as if **CTRL BREAK** had occurred.
Drive types or diskette types not compatible (DISKCOPY, DISKCOMP)	The source and target diskettes must have the same format capacity. See the respective command specifications.

ERROR MESSAGE	MEANING
(.)(..) Does not exist (CHKDSK)	This message indicates either the or .. directory entry is invalid.
Duplicate filename or file not found (RENAME)	Either an attempt has been made to rename a file with a file name that already exists in the directory, or the file to be renamed could not be found on the specified (or default) drive.
Dup record too complex (LINK)	There is a problem with an object module created from an assembler source program. A single DUP requires 1024 bytes before expansion. Debug the source program then return to the linker.
End of input file (EDLIN)	The entire file was read into memory. If the file is read in sections, this message indicates the last section of the file is in memory.
Entry error (EDLIN)	You have entered an EDLIN in command correctly. Re-enter the command.
Entry has a bad link/attribute/size (CHKDSK)	This message may be preceded by one or two periods indicating which subdirectory is invalid. If you have specified the /F switch, CHKDSK will try to correct the error.
Eof mark not found (COMP)	The end of valid data in the last block of two files being compared has not been found. Most likely to occur in non-text files.

ERROR MESSAGE	MEANING
Error in EXE file (MS-DOS)	The file contains erroneous relocation information created by LINK. The file may have been altered after creation.
Error in EXE or HEX file (DEBUG)	The EXE or HEX file contained invalid characters or records.
Error in IOCTL call (FORMAT)	You are trying to format a device, that does not need formatting.
ERROR Incorrect DOS version (DRIVER.SYS)	You are not boot-strapping MS-DOS Ver. 3.20. The device DRIVER.SYS will only work with MS-DOS Ver. 3.20.
ERROR No Drive Specified (DRIVER.SYS)	You did not specify a drive number, when you declared DRIVER.SYS in your CONFIG.SYS.
Error loading system from fixed disk (FDISK)	The operating system cannot be loaded from the fixed disk. Retry, or if that fails, boot the system from diskette and put a new copy of MS-DOS onto the fixed disk using the SYS command.
Error reading drive *x* (RECOVER)	Self-explanatory.
Error reading *file* (PRINT)	Self-explanatory.

ERROR MESSAGE	MEANING
Error reading partition table (FDISK)	Five unsuccessful attempts have been made to read the startup record from hard disk. Retry FDISK, of if that fails, try running your Customer Test as instructed by your Installation and Operations Guide.
Error writing to device (COMMANDS)	The device issued an I/O error and your data was not written. Retry.
Error writing partition table (FDISK)	Five unsuccessful attempts, have been made to write the startup record on the fixed disk. Retry FDISK, or if that fails, try running your Customer test as instructed by your Installation and Operations Guide.
Errors found, F parameter not specified. Corrections will not be written to disk (CHKDSK)	As the /F parameter was not used, an analysis of the disk will be made and the results displayed, but no corrections will be written to the disk.
Errors on list device indicate that it may be offline. Please check it. (PRINT)	Your printer is off-line.
EXEC failure (MS-DOS)	One of the following conditions occurred while reading a file from disk: Read error occurred. The FILES= *parameter* in the configuration file is not large enough. Increase the value and restart MS-DOS.

ERROR MESSAGE	MEANING
EXE and HEX files cannot be written (DEBUG)	The data would require a backward conversion that DEBUG does not support.
FATAL: Internal Stack Failure, System Halted	Too many hardware interrupts have been queued for the available stack resources. The system has crashed. Reset the computer to reboot the operating system. See the section "STACKS" in Appendix C "Configuring MS-DOS", which tells you how to configure MS-DOS to prevent this from happening.
File allocation table bad drive *x* Abort, Retry, Ignore? (MS-DOS, CHKDSK)	See "Device and Disk Drive Errors" at the beginning of this appendix. If the error persists, the disk should be reformatted.
Files are different sizes (COMP)	The specified files are not of the same length and cannot be compared.
File *xxx* canceled by operator (PRINT)	When the operator cancels printing, this message appears on the screen.
File cannot be converted (EXE2BIN)	The input file you have specified does not have the correct format for conversion.
File cannot be copied into itself (COPY)	A request was made to COPY a file and place the copy (with the same name) in the same directory as the source file. Either change the name given to the copy or put it on another diskette or directory.

ERROR MESSAGE	MEANING
File Error (SELECT)	You have a problem with your source or target diskette. Run CHKDSK on them to determine the cause of the error.
File creation error (MS-DOS and commands)	An unsuccessful attempt was made to add a new file to the directory. Run CHKDSK to determine the cause of the error.
File is READ-ONLY (EDLIN)	You may not change this file because the file is designated read-only. If you really want to write to this file, use the ATTRIB command to give the file a read/write attribute.
File name must be specified (EDLIN)	You did not specify a file name when you started EDLIN.
File not found (MS-DOS and commands)	A file named in a command does not exist on the disk in the specified (or default) drive.
File not in PRINT queue (PRINT)	The file you want to remove from the print queue is not in the queue.
FIND: File not found *filename* (FIND)	A non-existent file name was specified when issuing a FIND command.

ERROR MESSAGE	MEANING
FIND: Invalid number of parameters (FIND)	A string was not specified when issuing a FIND command.
FIND: Invalid parameter *option-name* (FIND)	You specified an invalid parameter to the FIND command.
FIND: Read error in *filename* (FIND)	An error occurred when FIND tried to read the file specified in the command.
FIND: Syntax error (FIND)	You entered an illegal string when issuing the FIND command.
First cluster number is invalid, file truncated (CHKDSK)	An invalid pointer to the data area has been found in the file whose name precedes this message. If /F was specified, the file is truncated to zero length.
Fixup offset exceeds field width (LINK)	An assembly language instruction refers to an address with a short instruction instead of a long instruction. Edit the assembler source program and process it again.
Fixups needed-base segment (hex): (EXE2BIN)	The source (.EXE) file contained information indicating that a load segment is required for the file. Specify the absolute segment address at which the finished module is to be located.

ERROR MESSAGE	MEANING
Invalid characters in volume label (FORMAT)	Volume labels may contain up to 11 printable characters without a period (.).
Invalid COMMAND.COM in drive *X* (MS-DOS)	The program you have just run used up almost all of memory. MS-DOS must now reload the transient part of COMMAND.COM file from disk. However, MS-DOS cannot find COMMAND.COM on the disk or the copy found is invalid. Insert a disk into the *X*: drive which contains the same version of COMMAND.COM that you started with. Press any key to commence the reloading.
Invalid country code (MS-DOS) (SELECT)	You have specified a country number in your SELECT command or CONFIG.SYS file which is not configured in this implementation of MS-DOS. Country codes must be in the range 1-999 and are the same as the International dialing code for the selected country.
Invalid current directory (MS-DOS)	Your disk is bad. Replace the disk or make another copy from your backup system disk.
Invalid current directory. Processing cannot continue (CHKDSK)	CHKDSK has found an error in the disk's current directory. Restart the system and rerun CHKDSK.

ERROR MESSAGE	MEANING
Invalid date (MS-DOS, DATE)	You specified an invalid date in response to the date prompt when starting MS-DOS or when using the DATE command.
Invalid device (CTTY)	The specified device name is invalid in MS-DOS.
Invalid device parameters from device driver (FORMAT)	FORMAT displays this message when the number of hidden sectors is not evenly divisible by the number of sectors per track (i.e., the partition does not start on a track boundary). This might happen if you tried to format a hard disk that previously had been formatted with MS-DOS Version 2.11 without first running FDISK.
Invalid directory (MS-DOS)	The directory you specified either does not exist or is invalid. Check to see that you entered the directory name correctly.
Invalid disk change	You changed the disk in a drive when it was not allowed. Put the disk back in the drive and press **R** for Retry.
Invalid drive in search path (MS-DOS)	One of the paths specified in the PATH command contains an invalid drive name. This error occurs during execution, not during the PATH command.

ERROR MESSAGE	MEANING
No files replaced (REPLACE)	No files on the target were replaced.
No fixed disks present (FDISK)	You cannot run the FDISK program due to one of the following conditions: • No fixed disk attached. • Fixed disk is present in the expansion unit but the unit is not switched on. • Fixed disk is incorrectly installed.
No free file handles Cannot start COMMAND, exiting (MS-DOS)	Reload MS-DOS. If this message persists, increase the size of the FILES = *parameter* in the CONFIG.SYS file, and reload MS-DOS.
No free file handles (MS-DOS)	You have tried to load a second copy of the command processor, but too many files are currently open. Increase the size of the FILES = *parameter* in the configuration file and reload MS-DOS.
No MS-DOS partition to delete (FDISK)	You have used the Delete DOS Partition option when no such partition exists on the current fixed disk or you have tried to delete a non-existent partition.

ERROR MESSAGE	MEANING
No MS-DOS partition. Use FDISK to correct (FORMAT)	An attempt has been made to format a hard disk that does not have an MS-DOS partition.
Non-DOS disk (device error)	The file allocation table contains invalid information. The disk must be reformatted.
No object modules specified (LINK)	You have not specified any object modules for the linker
No operating system on fixed disk (FDISK)	Self-explanatory.
No paper (device error)	The printer is either not switched on or is out of paper.
No path (MS-DOS)	You typed PATH to display your search path. There is no current command search path.
No room in directory for file (EDLIN)	The directory of the specified diskette is already full, or the specified disk drive or file name is illegal.
No space for a *XXX* cylinder partition at cylinder *YYYY* (FDISK)	There is not enough space on disk to accommodate a partition with the specified number of cylinders at the specified position.

ERROR MESSAGE	MEANING
Read fault (device error)	MS-DOS cannot read the requested data from the named device.
Read error in: *filename* (Commands)	The command could not read the entire file.
Requested drive is not available (FORMAT)	Self-explanatory.
Requested stack size exceeds 64K (LINK)	You have tried to specify a stack size greater than 64 Kbytes.
Rom BASIC not available Press reset to re-boot (BIOS)	If this message occured when you tried to boot from hard disk, the most likely cause is that there is no active partition on the hard disk. Bootstrap from floppy disk, run FDISK to make the bootable partition active. If this mesage occured when you are running a program, that program may have been trying to access Rom BASIC or a spurious soft interrupt 18 hexadecimal occured.
Sector not found (device error)	The sector containing the data cannot be found, usually due to a defective area on the disk.

ERROR MESSAGE	MEANING
Sector size too large in file *filename* (Startup)	The device sector size defined in the device driver filename exceeds the system limit.
Seek (device error)	The disk drive cannot find the proper track on the disk.
Segment size exceeds 64K (LINK)	You have tried to combine identically named segments resulting in a segment requirement of more than the addressing limit of 64 Kbytes.
SHARE already installed (SHARE)	Share can only be installed once.
Sharing buffer exceeded (device error)	The memory space allocated by the command SHARE is insufficient. Rebootstrap your computer and call SHARE with a larger memory space parameter. If the message re-occurs, continue to increase the size of the memory space parameter.
Sharing Violation (device error)	A program tried to access a file, but another program is using that file. Press **A** to Abort, or wait a while and press **R** to Retry.
Source and target drives are the same (BACKUP) (RESTORE)	Specify a different source and target drive in your BACKUP or RESTORE command.

ERROR MESSAGE	MEANING
Unexpected end-of-file on library (LINK)	There is probably an error in the library file.
Unexpected end-of-file on VM.TMP (LINK)	The diskette containing VM.TMP is not present in the drive.
Unrecognized command in CONFIG.SYS	You have entered an invalid command in the configuration file.
Unrecoverable error in directory. Convert directory to file (Y/N)? (CHKDSK)	If you press **Y** in response to this prompt, CHKDSK will convert the bad directory into a file. You can then fix the directory yourself or delete it. If you press **N**, you may not be able to write to or read from the bad directory.
Unrecoverable file sharing error (SHARE)	Caused by a file-sharing conflict.
Unrecoverable read error on drive *d*: (DISKCOMP) (DISKCOPY)	Self-explanatory. The diskette has probably been damaged.
Unresolved externals: *list* (LINK)	The external symbols listed were not defined in the modules or library files. Do not attempt to run the file created by the linker.
VM.TMP is an illegal filename and has been ignored (LINK)	You cannot use VM.TMP as an object module.

ERROR MESSAGE	MEANING
Warning: directory full (RECOVER)	No more files can be recovered in the directory.
Warning-Diskette may be unusable (DISKCOPY)	After an unrecoverable read, write or verify error, the copy may be corrupted.
Warning: diskette is out of sequence Replace diskette to continue. Strike any key when ready. (RESTORE)	Self-explanatory.
Warning: The file above is marked read-only. Replace the file (Y/N)? (RESTORE)	When RESTORE /P is specified and the file encountered is read-only; answer **Y** if you want to replace the file or **N** if not. When you type **ENTER**, RESTORE will continue.
Warning: The file above was changed after it was backed up. Replace the file (Y/N)? (RESTORE)	When RESTORE /P is specified and the file on the target disk has a later time and date than the same named file on the source disk; answer **Y** if you want to replace the file on the target disk or **N** if not. When you type **ENTER**, RESTORE will continue.
Warning: no files were found to backup (BACKUP)	Check your backup file specifications for incorrect input.

GLOSSARY OF TERMS

The following table defines the terminology in this manual.

TERM	MEANING
active partition	The partition on hard disk which contains the operating system files enabling the bootstrapping of the computer. This happens on system reset or when the computer is turned on.
ASCII	American Standard Code for Information Interchange. A 7 BIT code, which has been extended to an 8 BIT code (a BYTE) to represent graphic characters and international characters.
basic input output system (BIOS)	Part of the operating system which provides an interface with the machine hardware. Most of the BIOS is in Read Only Memory (ROM), the rest is loaded from the system disk.
binary digit (BIT)	In a binary numbering system, only two marks are used 0 and 1. Each of these marks is called a binary digit.
bootable file	A file of a specific format that the bootstrap loader can load into memory to initialize the system.
byte	Eight bits, which is normally a code for an ASCII character.
current directory	The directory in which you are working.

TERM	MEANING
cylinder	Hard disks usually consist of a number of platters. A cylinder refers to the same track on each surface of the platters which form a notional cylinder.
disk	A diskette or hard disk.
diskette	A single or double-sided floppy disk.
drive specifier	A letter referring to the diskette drive or hard disk drive in question. For example it may be: A - first diskette drive. B - second diskette drive. C - hard disk drive.
editing function keys	The keys that invoke the intra-line commands.
external command	A command that is not loaded into memory at initialization. Such commands reside on disk from where they are loaded, executed and then purged from memory.
formatting	Disks must be formatted before they can be used with MS-DOS. Formatting places tracks, which are split into sectors, onto the surface(s) of a disk. The sectors are all the same length, typically 512 bytes. Also formatting places a boot record and an empty directory on the disk.

TERM	MEANING
hard disk (or fixed disk)	A sealed storage unit with non-removable surfaces. A hard disk can store much more information than a floppy disk, and the computer can retrieve information from it faster.
hardware reset	A system reinitialization caused by pressing the physical reset button. The subsequent initialization includes diagnostic tests and a reset of all system parameters. Any AUTOEXEC.BAT file or CONFIG.SYS file is executed.
inter-line commands	The EDLIN commands that operate on entire lines of text.
intra-line commands	The commands invoked by the special editing function keys that perform editing operations within a single line of text.
internal command	A command that is embedded in the COMMAND.COM file and resides in memory whenever MS-DOS is booted.
Kilobyte KB	2 to the power 10 = 1024 Bytes
Mega-byte MB	2 to the power 20 = 1 048 576 Bytes
nil parameter	A parameter to a command where the parameter in question is not specified in the command line. The parameter therefore assumes a default value.

TERM	MEANING
partition	A certain number of cylinders of a hard disk, which have been set aside for the use of a particular operating system. That operating system treats the partition like a complete, but smaller, hard disk. The maximum partition size allowed for MS-DOS is 32 MB. The number of cylinders this corresponds to, depends on how many bytes there are per cylinder.
pathname	A sequence of one or more directory names separated by backslashes, optionally beginning with a drive specifier and optionally terminating in a file name. It specifies a path through a directory structure to access a file or directory.
sectors	The track on a disk is divided into sectors. MS-DOS disks are soft sectored. The number of sectors per track, on a floppy disk, is typically 8, 9, 15 or 18.
source line	A line of text containing either the last command line entered or the current line in a file being edited. It can be retrieved in whole or part or modified using the special editing function keys.
system file	An MS-DOS file that is present on the MS-DOS system diskette that contains system software. There are three such files: Two hidden files and COMMAND.COM.

TERM	MEANING
system reset	A system reinitialization caused by pressing the **CTRL**, **ALT** and **DEL** keys simultaneously. Any AUTOEXEC.BAT file or CONFIG.SYS file is executed.
text file	An ASCII file whose records are separated by CR/LF.
tracks per inch (t.p.i.)	A disk track is the circular locus of the head as the disk rotates. The head can be moved to the other tracks; they are concentric circles. A double density diskette has 48 t.p.i. A quad density disk has 96 t.p.i. A 3 1/2 inch diskette has 135 t.p.i.
virtual disk	An emulation of backing store in Random Access Memory (RAM). It is faster than disk backing store, but the information on virtual disk is lost when the computer is turned off.
volume label	A name that can be assigned to a disk by the FORMAT command. It will subsequently be displayed in a directory listing, or by the VOL command.
wild card character	A special symbol used to represent any single character (?), or any string of characters (*).
working session	The time between booting MS-DOS and the next boot of MS-DOS or switch-off.

INTRODUCTION

A virtual disk is part of Random Access Memory which emulates a backing store Disk. The VDISK.SYS is a device driver, which when installed, enables a virtual disk drive with the next available drive letter. For example if you have a two physical drive machine, with two physical drives "A:" and "B:", when VDISK.SYS is installed, you will have an extra drive "C:". The only difference between virtual disk and real disk is that when you turn your machine off, the information on virtual disk will be lost. So remember to COPY all files you want to keep, from virtual disk to a real disk, before you turn your machine off.

INSTALLING VDISK.SYS

VDISK.SYS is a file included on your MS-DOS Diskettes. To install the VDISK console drive the following command must be placed in the CONFIG.SYS file.

DEVICE = VDISK.SYS [*disk-size*][*sector-size*][*entries*] [**/E**[**:** *max*]]

Where

SYNTAX ELEMENT	MEANING
disk-size	A decimal value declaring the virtual disk size in Kilo Bytes. The value be from 1 through the maximum free Random Access Memory on your computer. The default is 64 Kilo bytes.
sector-size	A decimal value declaring the sector size in bytes. The value may be 128, 256 or 512. The default is 128 bytes.

SYNTAX ELEMENT	MEANING
entries	A decimal number declaring the maximum number of directory entries required for files. One entry is used for a volume label. Three entries are used for each sub-directory. The value may be from 2 through 512. The default is 64 entries.
/E	This switch specifies that the VDISK driver uses "extended memory". MS-DOS can only directly address 640 KB. Random Access Memory installed over 640 KB is "extended memory". This option is only available on Intel 80286 based Personal Computers, do not use this switch for other Personal Computers.
:max	This is a parameter of the /E switch, specifying the maximum number of sectors (of sector-size) to be transferred to/from extended memory. The possible values are a decimal number in the range 1 through 8. The default value is 8.

For example place the following assignment in CONFIG.SYS.

```
DEVICE = VDISK.SYS 128 512 32
```

Reboot your computer and a message similar to the following will be displayed:

```
VDISK Version 3.20 virtual disk D:
    Directory entries adjusted
    Buffer size: 128 KB
    Sector size: 512
    Directory entries: 32
```

Refer to Appendix C for more details of CONFIG.SYS.

Remarks

The following situations prevent VDISK from being installed.

- less than 64 KB free memory.
- using the /E switch with insufficient extended memory.

In these cases the following message is output on the screen.

VDISK not installed insufficient memory

VDISK.SYS might adjust the parameters you specified in the following ways:

PARAMETER	ADJUSTMENT
entries	Rounded up: 32 bytes (per file entry) multiplied by entries (rounded up) equals a multiple of sector-size. This is so as not to waste space available for directory entries. Rounded down: one sector at a time times sector-size divided by 32 bytes, until there are sufficient sectors to hold the File Allocation Table, the directory entries and at least two sectors for files. When the number of sectors for directory file entries has been rounded down to one, the above error message is issued. In this case redeclare the VDISK parameters in CONFIG.SYS and reboot the system.
disk-size	Rounded down: so as to leave 64 KB Random Access Memory free. If this is not possible the above error message is issued. In this case you need to install more Random Access Memory in order to use VDISK.

Remarks

You can install more than one virtual disk by placing several **DEVICE = VDISK.SYS** commands in your CONFIG.SYS. Each virtual disk takes the next available drive letter. If the next available drive letter for the virtual disk is "F:", place the command:

```
LASTDRIVE = F
```

before your DEVICE command in CONFIG.SYS. Refer to Appendix C for more details.

Warning

Using VDISK in extended memory with networking installed, may lead to problems of lost interrupts and corruption of the virtual disk. If you have such problems, try setting the *max* parameter of the /E switch to 1. If this does not cure the problems, then you cannot place the declaration "DEVICE = VDISK.SYS /E" in the CONFIG.SYS, when you are going to load networking.

INTRODUCTION

The DRIVER.SYS is a device driver, which when installed either: enables a new block device to be installed; or enables existing block devices to be referred to as a new logical block device with different characteristics.

If you have installed an external floppy disk drive, you can create a block device driver for this drive using DRIVER.SYS; this will be referred to by the next available drive letter. For example on a twin floppy disk drive machine, when DRIVER.SYS is installed, the extra external drive will appear as drive C:.

The following is an example of the use of DRIVER.SYS for referring to an existing floppy disk drive by another drive letter. If you have a computer with a 1.2MB floppy disk drive and a hard disk. Before installing DRIVER.SYS for the 1.2MB drive, the drive letters A: and B: refer to this drive. After installing DRIVER.SYS for this drive, the drive letter "D:" can refer to the floppy disk drive specifically for handling 360KB diskettes. So to copy files from a 360KB diskette to a 1.2MB diskette, you could enter the command:

```
COPY D:*.* A:
```

MS-DOS will prompt you to enter the respective diskettes.

INSTALLING DRIVER.SYS

DRIVER.SYS is a file included on your MS-DOS Diskettes. To install this driver the following command must be placed in the CONFIG.SYS file.

DEVICE = DRIVER.SYS /D: *drive-no* [**/C**] [**/F:** *form-factor*]

[**/H:** *heads*][**/N**] [**/S:** *sectors*][**/T:** *tracks*]

Where

SWITCH	PARAMETER	MEANING
/D	*drive-no*	Specifies the physical drive number between 0 and 255. Floppy disk drives start at 0, hard disks start at 128.
/C		Disk change support is required.
/F	*form-factor*	Specifies the media format and kind to be supported: 0 320/360 KB 1 1.2 MB 2 720 KB (default) 3 8 inch single density 4 8 inch double density 5 Hard Disk 6 Tape Drive 7 Other
/H	*heads*	Specifies the number of heads on the disk drive. Its value can range from 1 to 99. The default is 2 heads.
/N		Specifies a non-removable block device such as a hard disk.
/S	*sectors*	Specifies the number of sectors per track. Its value can range from 1 to 99. The default is nine sectors per track.
/T	*tracks*	Specifies the number of tracks per side. Its value can range from 1 through 999. The default is 80 tracks per side.

H. THE DISK CACHE SYSTEM

ABOUT THIS APPENDIX

This appendix describes how to install OLICACHE.

CONTENTS

INTRODUCTION

The disk cache system stores frequently accessed backing store data in a main memory buffer (or cache). This means that when this data is read by a program, it is read from main memory instead of from backing store.

This can improve the access time by a factor of between 10% and 25% of the original access time. The performance varies depending upon the disk access profile of the application and upon the efficiency of the particular hard disk controller. However the variation among the efficiencies of the different disk controllers is within 3%.

This software driver provides a cache for data being read, not for data being written. When data is written the disk is updated. However if the data sector is being cached, the cache is also updated. This means that data read from cache is always consistent with the data on the disk.

INSTALLING OLICACHE.SYS

OLICACHE.SYS is a device driver which must be declared in the CONFIG.SYS file of the MS-DOS System Disk used for bootstrapping the computer. Make OLICACHE.SYS the first device declaration in the CONFIG.SYS file.

OLICACHE.SYS is a file included on your MS-DOS Diskettes. It must be present in the root directory of the MS-DOS System Disk. To install the disk cache the following command must be placed in the CONFIG.SYS file:

DEVICE = OLICACHE.SYS [*kilobytes*] [**/E**] [**/R***n*]

Where

SYNTAX ELEMENT	MEANING
kilobytes	A decimal value declaring the amount of memory available, in KB (Kilo Bytes) to cache disk sectors. If your hard disk uses 512 Byte disk sectors, then 50 KB will hold 100 disk sectors, as 1024 Bytes equals 1 KB. If you do not specify the /E switch (see below), you can declare a value from 50 KB through 256 KB in memory with an address of below 640 KB. If you specify the /E switch (see below), you can declare from 50 KB through 15360 KB. The default in both cases is 50 KB.
/E	This switch specifies that the OLICACHE driver uses "extended memory". MS-DOS can only directly address 640 KB. Random Access Memory installed over 640 KB is "extended memory". This option is only available on Intel 80286/80386 based Personal Computers, do not use this switch for other Personal Computers.
/R*n*	The minimum number of sectors that are transferred to cache memory. The possible value is a decimal number: 2 or 4 or 8. The default is 4 sectors.

Characteristics

Refer to Appendix C "Configuring MS-DOS" for more details of CONFIG.SYS.

The OLICACHE.SYS becomes resident as a device driver with the name $$$CACHE, taking up 12 KB of main memory. In addition the declared cache memory is taken up in normal or extended memory. (Programmers, please do not use the name $$$CACHE or access this device driver.)

You are recommended to set

BUFFERS = 10

in your CONFIG.SYS. A higher value is not needed, because Olicache provides additional buffering, for reading the Hard Disk.

Examples

For example on a machine without extended memory place the following declaration in the CONFIG.SYS file:

DEVICE = OLICACHE.SYS

This example uses the default settings to set up a disk cache of 50 KB in normal memory, transferring 4 sectors at a time.

Or for example on a machine with extended memory place the following declarations in the CONFIG.SYS file.

DEVICE = OLICACHE.SYS 1000 /E /R8

This example sets up a disk cache of 1000 KB (with room to hold 2000 512 byte sectors) in extended memory, transferring 8 sectors at a time.

Rebootstrap your computer and a message similar to the following will be displayed.

Resident part of OLICACHE 1.00 installed

Error Message

The following situations cause OLICACHE to fail to install.
- less than 62 KB free memory for the default settings or less than sufficient memory for the cache size chosen.
- using the /E switch with no or insufficient extended memory.

In these cases the following message is output on the screen.

Not enough memory for specified size
OLICACHE not installed

Remarks

OLICACHE will not work efficiently unless the file being read is contiguous on disk, that is the file is not fragmented. Use the command

CHKDSK *.*

to find out whether the files in the current directory are contiguous or not. If they are not contiguous, optimize the disk layout, using the BACKUP and RESTORE commands or some other program which makes files contiguous on hard disk.

Warning

In a networking environment OLICACHE may cause lost interrupts, when it has been declared with the /E switch; that is when the cache is in extended memory.

If such problems occur, redeclare OLICACHE without the /E switch, that is with the cache in normal memory.

INDEX

D

E

F

G

H

I

J